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OVEMBER-DECEMBER, 1954 Vol. 8, No. 6

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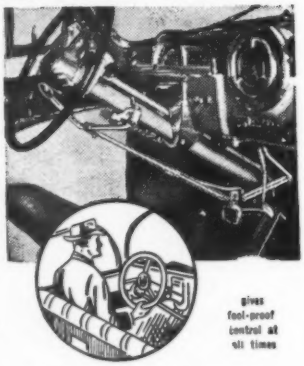

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REHABILITATION FOLLOWING SURGICAL REPAIR OF SHOULDER DISLOCATIONS*

J. L. RUDD**

Introduction

In a previous paper[1] a study was made to determine whether postoperative exercises for recurrent shoulder dislocation repaired by the Bankart[2] method had resulted in greater gains in strength, an earlier increase in the range of shoulder motion and a decrease in the length of the average recovery period in comparison with those cases which did not receive similar postoperative supervised activity.

A Supervised Program

In a Naval hospital sixteen cases were given early and intensive physical rehabilitation by means of a definite exercise program planned and arranged with the assistance of the exercise therapist. The sixteen cases to be actively exercised were referred to the rehabilitation section approximately 3.4 weeks after the Bankart operation. Their activity was closely supervised for a three to five week period. A longer hospitalization was possible with the Naval group since it was the policy of that service not to return a sailor to full duty after an operation until he was capable of doing his work. The importance of striving for as full a range of motion as possible from the very first, was stressed; then the aim was concentrated towards increasing the strength of the shoulder girdle musculature.

In comparing the results of those who had the exercise in the military hospital with those who had had no definite planned physical rehabilitation, it was found that the former regained greater range of motion and strength and returned to duty earlier. Rehabilitation was so effective that, after an average of three weeks in physical medicine activities, many of the supervised group could raise as much as fifty to seventy-five pounds over their heads with the two-hands press (bar lifted to chest, then over head). It was the wish of the Naval hospital orthopedic staff that their Bankart cases be sent to the corrective therapy section in three to three and a half weeks to receive a definite exercise program. The orthopedic staff removed the Velpeau bandage, transferred the extremity to a sling and gave the Codman[3] exercises on their ward. This was about two and a half weeks after surgery—a week before the patient was sent to our department.

On the average, it required *less than two and a half months* after operation for this earlier and more actively treated group to reach a maximum range of motion and return to full duty, compared to an *average of five months* in those who had a Bankart operation, but who were not on a planned physical activities program.

A Nonnaval Hospital Program

In a nonnaval hospital I had an opportunity to follow twenty-four postoperative shoulder cases corrected by the Bankart method. At that hospital, *at that time,* general shoulder exercises were *advised* by the orthopedic service, on an average of 4.4 weeks postoperatively. The patients who had the Bankart operation (the labrum and soft tissues reattached to the freshened neck of the scapula, the two layers of the capsule sutured through holes to the neck of the scapula in some internal rotation; the subscapularis cut and sutured) were *not* sent to physical medicine. It was the policy of this hospital to discharge the patients as soon as the wound had healed. They would then report back to the orthopedic follow up, out-patient clinic, for examination, general instruction and advice regarding the type and extent of physical activity permitted. Since the policy of this nonmilitary hospital required the discharge of patients as quickly as possible after an operation, there was a shorter hospital stay with little or no opportunity for the administration of daily, progressive, supervised corrective therapy.

Seven cases at this same nonmilitary hospital were subsequently given concentrated activity on an outpatient basis and are compared to the original twenty-four at the same hospital that, at an earlier date, were not given personal exercise-attention by the physical medicine or orthopedic section.

---

*Presented at the Eighth Clinical and Scientific Session. The Association for Physical and Mental Rehabilitation, Cleveland, Ohio, June 29, 1954.

**Chief, Physical Medicine and Rehabilitation Service, Veterans Administration Hospital, Brockton, Mass.

[1] RUDD, J. L., and HAYDOCK, E. F.: *Exercises Following the Bankart Operation for Recurrent Shoulder Dislocation,* Archives of Physical Medicine, June, 1952, Volume XXXIII, pp. 353-357.

[2] BANKART, A. S. B.: *Operation for Recurrent Shoulder Dislocation,* Brit. M. J., 2:1132.

[3] CODMAN, E. A.: *The Shoulder,* Thomas Todd Co., Printers, Boston, Massachusetts, 1943, pp. 202.

TABLE I

Seven Cases At The Nonmilitary Hospital That Had Supervised Activities Early

Name	Age*	Bankart Operation	1st Ex.	Resist. Ex.**	Return To Work***
J. P. Mc.	24 yrs.	12/11/50	5 wks. later to PMRS	6 wks. post-operative	3 months back to printer compositor job.
K. J.	23 yrs.	1/10/51	4½ weeks	6½ weeks	3 months back to work as maintenance man.
R. A. P.	30 yrs.	7/20/51	3 weeks	4 weeks	2 months for shoe pattern maker.
J. H. J.	25 yrs.	11/19/51	3½ weeks	4½ weeks	2½ months for telephone line repair man.
E. E.	22 yrs.	1/21/52	3½ weeks	5 weeks	2½ months ready for laborer work. (raises 50 lbs. flexion of shoulder).
G. M.	25 yrs.	4/1/53	3 weeks	4 weeks	2 months linoleum layer. (home in 35 days able to lift 20 lbs. over head in 4 weeks).
J. Q.	58 yrs.	5/16/52	12 days	5 weeks	3 months .Fireman. Retired. (We believe he could get back to work as a fireman).

A Nicola & Dickson operation. (No subscapularis tendon along anterior cuff so no Bankart done).

* Average age is 30 years. Average time of first exercise is 3½ weeks.

** Average time of resistive exercises is about 5 weeks.

*** Average time of return to work is 2¾ months.

The above compares favorably with the Naval hospital statistics and indicates that regardless of the type of hospital, early supervised activity will get results. This was so even though some of the seven referrals were two to three weeks late for their first exercise session in the physical medicine and rehabilitation department.

The additional observations on the seven cases further confirmed our belief that fairly strenuous activity can be given to a postoperative Bankart case, quite early, with little fear of recurrent dislocation or injury. More than that, it seemed almost impossible after a period of healing, to cause dislocation with reasonably strenuous exercises if given under the watchful eye of the therapist. The orthopedic consultants expressed themselves verbally to that effect. Such an attitude based on experience with postoperative Bankart cases encouraged us to recommend early exercise for rapid rehabilitation to all such cases as well as in some of the other types of shoulder disability.

The results in the seven cases are indicated by the chart (Table I).

Exercises Also Useful in Other Conditions

With few changes, the following exercises will sound familiar to those who work actively with orthopedic patients in the rehabilitation of disorders of the shoulder. Not only is the exercise routine applicable to the postoperative Bankart case, but it has been and may be used after some of the ordinary dislocations, after certain fractures around the shoulder joint, for partial rotator-cuff tears and for acute or chronic bursitis.[4] Periarthritis, arthritis, frozen shoulder, bicipital rotator cuff tendonitis, causalgic states (reflex sympa-

[4]CULLINAN, JOHN F.: *A New and Conservative Approach to the Management of Uncomplicated Subdeltoid Bursitis*, American Practitioner and Digest of Treatment, Dec., 1952, Vol. 3 N. 12 p. 1002-3., J. B. Lippincott Co., Philadelphia.

thetic dystrophy) as well as some of the other not too clear-cut conditions causing pain and stiffness around the shoulder area, may derive some benefit from carefully conceived and executed motions. The pain and stiffness is almost always due to a chronic disease or old injury resulting in disuse and atrophy around the shoulder girdle. This may be benefited by some form of physical therapy preceded, accompanied or followed by graded activities.

Exercise Routine

Patients who are exercised daily report to the rehabilitation therapy section wearing a simple sling. The range of shoulder flexion, extension, abduction, internal and external rotation is determined and compared to the uninvolved upper extremity which is used as the one with normal ranges, if no pathology is present.

Of the large number of exercises utilized for shoulder mobilization and for strength, those noted below were preferred. Contralateral shoulder exercises and muscle tensing preceded all these, as well as general conditioning.

FIRST THREE DAYS OF TREATMENT:

1. Codman's stooping exercises were performed during every exercise period until the patient had obtained his maximum range of motion. About ten minutes were spent on these pendulum motions in the beginning stage. When out of the Velpeau, luminous heat, gentle, superficial massage, as well as immersion in the Hubbard tank is used to relax the tightness around the shoulder girdle and permit earlier and more complete motion. The Hubbard tank (in which the affected shoulder pointed towards the warm whirling stream of water) helped to diminish the postoperative spasm. An early gain in the range of motion because of the buoyancy, warmth and agitation of the water resulted. Strength was increased by the use of swimming strokes like the dog paddle, the plain or overhand sidestroke or the simple breast stroke. This was done against the moderate resistance furnished by the water. The back stroke was avoided, since it involved too much abduction and some external rotation.

2. In a supine position, holding a wand with both hands, arms extended as much as possible, the patient raises the affected arm into forward flexion. The palm, held inwardly, prevented outward rotation of the humerus on the operated side.

3. By means of a ceiling pulley, the patient attempts to stretch the repaired upper extremity into forward flexion and abduction by active assistive exercises. The involved shoulder should not elevate on this motion. This stretching, by the patient, is done to tolerance. This pulley is attached to the ceiling with a mirror so placed that the patient can observe the movement of the joint.

4. Standing in front of the mirror with a wand, the patient attempts to raise the affected extremity into forward flexion with the assistance of the other arm. Hunching or elevating the shoulder will diminish the value of this exercise.

THIRD TO TENTH DAY OF TREATMENT:

1. A weight of three pounds is now held in the hand of the involved extremity during the pendulum exercises. A light weight seems to help relax the muscles around the humeral head.

2. The patient lies in the supine position holding a weight of five pounds in his hand and forward flexes the shoulder to its maximum. The palm of the hand is faced medially.

3. The conventional shoulder wheel is utilized to further increase range of motion.

4. A floor pulley is used with the patient supine on a plinth. This helps increase the stretch to maximum forward flexion. This is easy to do since he controls the motion of the involved shoulder with the other hand.

5. A rowing machine, using the "oars" as a support and as an aid to stretching is employed. The resistance bolt is gradually tightened.

TENTH TO FOURTEENTH DAY:

The resistance bolt on the shoulder wheel is tightened. Supervised punching bag exercises[5] are started. This activity helps bring relief from the monotony of routine motions and further develops range, endurance, coordination and strength. The punching bag may be raised or lowered, different methods or positions are assumed so that all the muscles of the shoulder girdle will be exercised. Striking the bag aids the individual in acquiring a permanent recreational skill which can be developed further. It includes not only the total mobilization of the muscles of the involved upper extremity, but, by increasing the force of the blows and increasing the length of the exercise period, effective forms of "strength-endurance" as well as skill and coordination exercises may result. This type of progressive resistance helps develop not only the upper extremities, but also the back muscles, the abdominals and the muscles of the lower extremities.

By the *end of the third week* of treatment in our department the patients had a good range of motion as well as a fair amount of strength.

By the *end of the fourth week* most of the patients were able to do a few pushups and lift from fifty to one hundred pounds overhead. They developed strong

[5]RUDD, J. L., and MARGOLIN, R. J.: *The Punching Bag in Rehabilitation*, Journal of Bone and Joint Surgery, July, 1950, Vol. 32-A No. 3, pp. 698-699.

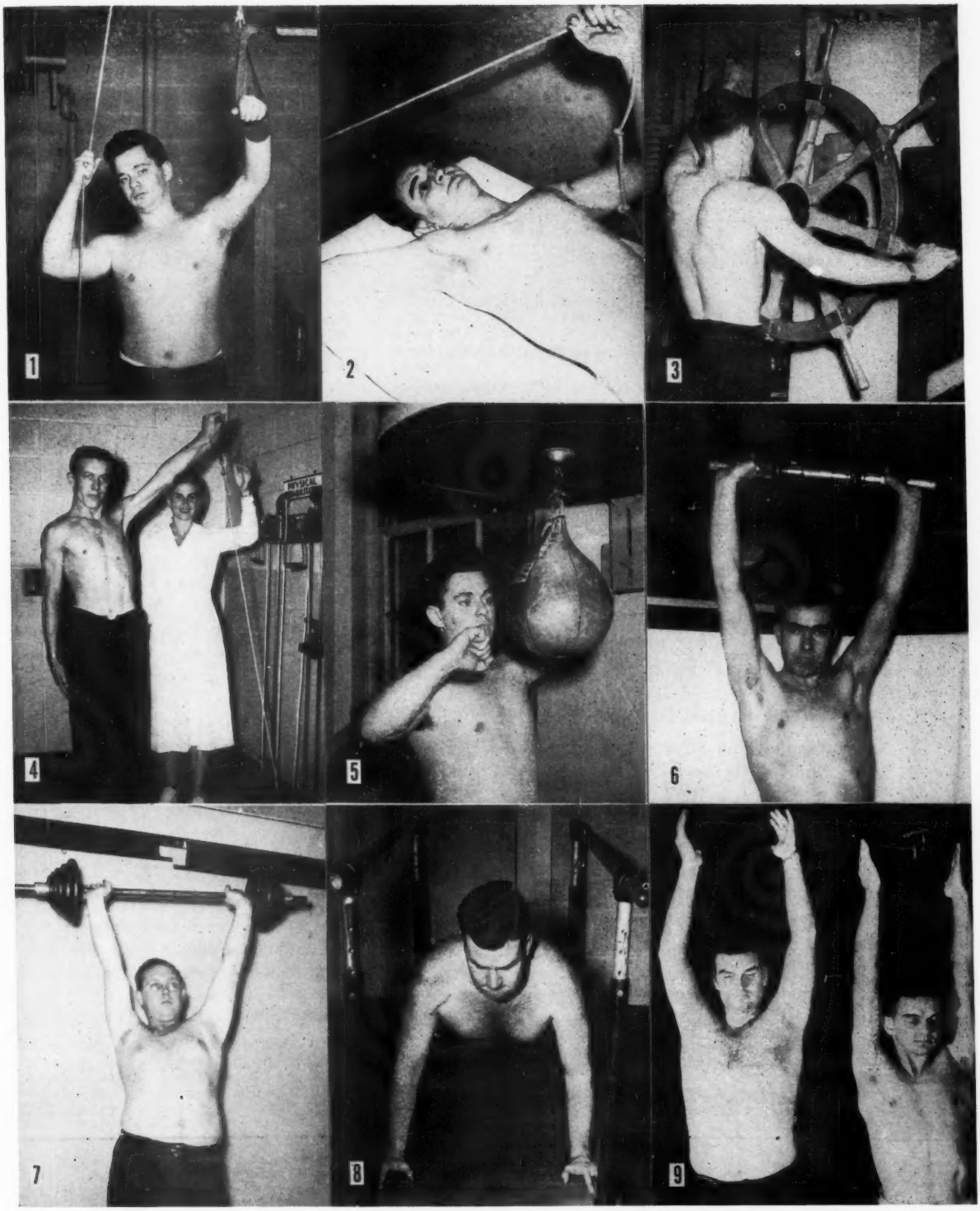

Fig. 1. Ceiling pulley for active assistive exercises.

Fig. 2. Floor pulley increases stretch to maximum forward flexion.

Fig. 3. Shoulder wheel.

Fig. 4. Active resistive exercise by use of floor pulley.

Fig. 5. Striking bag exercise.

Figs. 6. & 7. Progressive resistance exercises with weights.

Fig. 8. "Push-Ups"

Fig. 9. Range of Forward Flexion.

Photographs courtesy of the author who uses them primarily to explain exercises and routines to patients.

PERTINENT ANATOMICAL DATA IN SHOULDER CONDITIONS

The following muscles and nerves are involved in *abduction:*

a. Deltoid muscle supplied by the axillary nerve, C 5, 6.
b. Supraspinatus supplied by suprascauplar nerve, C 5, 6.

The following muscles and nerves are involved in *external rotation:*

a. Infraspinatus supplied by suprascapular nerve, C 5, 6.
b. Teres minor supplied by axillary nerve, C 5.
c. Deltoid supplied by the axillary nerve, C 5.

The following muscles and nerves are involved in *shoulder flexion:*

a. Deltoid muscle (anterior fibers, some middle also) supplied by axillary nerve, C 5, 6.
b. Coracobrachialis supplied by musculocutaneous nerve, C 7.
c. Biceps (accessory muscle) supplied by musculocutaneous nerve, C 5, 6.
d. Brachialis supplied by musculocutaneous nerve, C 5, 6.
e. Pectoralis major muscle (accessory muscle) supplied by C 7, 5, T 1.

The following muscles and nerves are involved in *scapular elevation:*

a. Trapezius (upper fibers) supplied by spinal accessory nerve XI and branches from C 3, 4. (The lower fibers in scapular depression and middle in scapular adduction).
b. Levator scapulae supplied by C 3, 4.
c. Rhomboid major & minor (accessory muscles) supplied by C 5 dorsal scapular nerve. (Also help in scapular adduction and downward rotation).

The following muscles and nerves are involved in *internal rotation:*

a. Subscapularis muscle supplied by upper and lower subscapular nerve, C 5, 6.
b. Pectoralis major muscle supplied by medial and lateral anterior thoracic nerve, C 5, 6, 7, 8, Th 1.
c. Latissimus dorsi muscle supplied by thoracodorsal nerve, C 6, 7, 8.
d. Teres major muscle supplied by lowest subscapular C 5, 6.

The following muscles and nerves are involved in *"push-ups":*

a. Triceps muscle supplied by radial nerve, C 7, 8.
b. Serratus anterior muscle supplied by long thoracic nerve of Bell, C 5, 6, 7.
c. Deltoid muscle supplied by the axillary nerve, C 5, 6.
d. Coracobrachialis supplied by musculocutaneous nerve, C 6, 7.
e. Biceps muscle supplied by musculocutaneous nerve, C 6, 7.

Note: The rotator muscles in the rotator cuff not only revolve the humerus but serve to fix the head on the glenoid fossa when the arm is abducted and adducted.

forward flexion, abduction and fair external rotation. Most of this progress was accomplished by using a moderate amount of load with a moderate number of repetitions. Our exercise guide was the tolerance of the patient. He was never compelled to push, pull or lift a predetermined weight a definite number of times. The principle of moderate strain guided our work. This appeared to be a safe, commonly used, effective method of building up muscular strength without causing strained muscles or ligaments or effusions

REPLY TO QUESTIONNAIRE FROM ONE NOT REPORTING BACK FOR FOLLOW-UP

A Report from a Case

Amesbury, Mass.

May 17, 1954

Dear Doctor —:

I received your letter asking me about my shoulder after having the Bankart operation.

I am more than pleased with the results of the operation which was slightly over a year ago. I never have the fear of it ever dislocating. I have as much strength as ever. I can play all the sports with no trouble like football, hockey and can swing a baseball bat as hard as ever.

As long as you asked, there is one thing. After having some sort of a physical workout for some time, the arm tires quickly and pains uncomfortably until thoroughly rested, which is about a day or two. The elbow trouble started the day after the operation, but I was always told it was because of the position in the sling. I kept taking it out of the sling to eliminate it.

All in all I can easily live with just that. I am greatly pleased that it never comes out of the socket and have the mobility and strength in the arm that I have. I work with the Telephone Company installing dial systems throughout New England.

Hearing from you makes me realize you doctors really give us your best.

It was a pleasure being under your care.

Like I say, I am highly satisfied with the operation. That inconvenient trouble I mentioned is most likely natural.

Sincerely,
G. F. M.

P. S. I went to work 2 weeks after leaving the hospital at my old work for one month as a linoleum layer and had hardly any handicap.

into joints. The overload principle is present but not as a maximum overload. There is such a thing as moderate overload. There is too often a tendency to consider an "overload" as the maximum load one is barely able to lift a certain number of times.

A sufficient amount of strength to enable the individual to do his regular work has been developed in most of our patients by the use of moderately heavy weights lifted as many times as possible (usually not less than six, nor more than twenty) with moderate strain. The muscular power developed may not be sufficient to play football, basketball or do the strenuous work required of an active soldier, but is quite enough for the needs of that particular type of older individual or the one weakened by injury or disease.

Summary

A group of sixteen cases at one hospital plus seven at another were compared to another series of twenty-four cases that had had a Bankart operation for recurrent dislocations. The sixteen plus seven cases were given early supervised exercises 3.4 weeks, on an average, after their surgery and were able to return to work in *less than 3 months*. The twenty-four cases that were similarly operated upon were seen on an average of 4.4 weeks for exercise-advice on an outpatient basis without close supervision by the exercise therapist and were returned to work on an *average of 5 months* after operation.

Conclusions

The important points in this paper are:

1. The exercise program must be closely supervised. Haphazard exercise advice is not conducive to early mobilization.
2. Progressive resistance exercises can be accomplished by the use of "a moderate amount of load, moderate number of repetitions" form of activity which we found safe and effective in the postoperative treatment of the Bankart cases.

NATIONAL REHABILITATION ASSOCIATION AWARDS

Annual awards for achievement in rehabilitation were presented to Sen. Charles E. Potter (Rep.-Mich.) and Dr. Donald Covalt, Associate Director of the Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center, New York by the National Rehabilitation Association at its annual banquet, Oct. 26 in Baltimore, Md.

Senator Potter received the President's Award of the association for general achievement. He was a county welfare administrator in Michigan prior to World War II when he lost both legs in combat. Since the war the Senator has served as Coordinator of Rehabilitation Activities in the Federal Administration.

Dr. Covalt, one of this country's foremost physiatrists, received the W. L. Faulkes Award for technical achievement. The award is named in behalf of the founder of the association.

NEW RESEARCH ON FATIGUE AND REST

Dr. Robert C. Darling of the Department of Physical Medicine and Rehabilitation at Columbia University's College of Physicians and Surgeons has been awarded a grant by the Lorenz Foundation, Inc. to conduct physiological studies concerning the body's ability to recover from fatigue by resting. Dr. Darling is one of this country's experts in this field and was formerly associated with the Fatigue Laboratory at Harvard University.

NEW V.A. HOSPITAL OPENS

A new $26,500,000 Veterans Administration Hospital at First Avenue and Twenty-third Street, New York City was dedicated on Sept. 26 and the first patient admitted on Oct. 4 when the hospital began partial operation of its new facilities. Mr. William J. Dann has been appointed manager of the new hospital which expects to have approximately 600 beds available by June 30. Full capacity of the nineteen-story hospital is 1,252 beds.

STRENGTH AND ENDURANCE (Conditioning)

EFFECTS OF EXHAUSTIVE EXERCISE OF THE ELBOW FLEXOR MUSCLES*

H. HARRISON CLARKE, Ed. D.**

CLAYTON P. SHAY, D.P.E.***

DONALD K. MATHEWS, D.P.E.***

The Problem

Studies in ergography have been conducted in the Physical Education Research Laboratory at Springfield College since 1949. Initially, the studies were confined to devising precise procedures for single-bout elbow flexion and shoulder flexion ergography[1,2]. Eventually, objectivity coefficients from .81 to .90 were achieved when the exercise was carried to exhaustion.

In this process of studying ergography, several observations[3] concerning the relationship between the strength and endurance of muscles directly involved in the exercise were made, as follows:

1. The amount of weight required to induce exhaustion in a relatively short time varied from individual to individual, depending upon the strength of the involved muscles; and the amount of weight for each subject to lift could be determined as a proportion of that strength.

2. The work output of muscles in exhaustive performances was greater when in position to apply greatest strength at the point of greatest stress, which is at the point of initiation of each movement.

3. Even with a limited number of exhaustive bouts, the training effect, as determined by the increased cumulative distance the ergograph load could be lifted, was definite and positive. In addition, improved levels of endurance were maintained during a four-week lay-off.

The results reported above were a by-product of the basic study of ergographic precision. Consequently, a more systematic approach to the conditioning effect of ergographic exercise was attempted. Thus, the purpose of the present study was to determine the effects of single-bout ergography on the elbow flexor muscles, as reflected by changes in strength and endurance, two basic conditioning factors.

Figure 1

Ergograph Testing

The Ergograph: The instrument used to determine the endurance of the elbow flexor muscles was the Kelso-Hellebrandt ergograph[4]. In this ergograph (Figure 1), muscular strength is applied to a lever arm which turns an axle and sprocket in lifting the load. Thus, the external angle of resistance remains the same during the entire movement. Ergographic meas-

---

*This investigation of the muscular conditioning effects of exercise was a preliminary phase of a larger study of the effect of carrying loads on muscular strength conducted at Springfield College under subsidy of the Climatic Research Laboratory, Quartermaster Corps, Department of the Army.

**Research Professor, School of Health and Physical Education, University of Oregon.

***Graduate Division, School of Physical Education, Springfield College.

[1]Clarke, H. Harrison, "Precision of Elbow Flexion Ergography Under Varying Degrees of Muscular Fatigue." *Archives of Physical Medicine*, 33:279-288 (March) 1952.

[2]Clarke, H. Harrison, "Single-Bout Elbow Flexion and Shoulder Flexion Ergography Under Conditions of Exhaustion Testing," *Archives of Physical Medicine and Rehabilitation*, 34:240-246 (April) 1953.

[3]Clarke, H. Harrison, "Muscular-Strength Endurance Observations from Single-Bout Ergography," *Journal of Association for Physical and Mental Rehabilitation*, 7:8-11 (January-February) 1953.

[4]Hellebrandt, F. A., Helen V. Skowland, and L. E. A. Kelso, "New Devices for Disability Evaluation: 1. Hand, Wrist, Radioulnar, Elbow, and Shoulder," *Archives of Physical Medicine*, 29:23 (January) 1948.

urement is made in cumulative distance the load can be lifted during a prescribed test bout, as read in centimeters from a distance meter located in the tower of the ergograph.

Testing Position: The testing position of the subject for elbow flexion ergography was as follows: (Figure 1) supine lying with hips and knees flexed, feet resting on table, and free arm on the chest. The center of the elbow joint was located opposite the shaft of the ergograph. At the end of the ergograph lever arm, set for a length of eight inches, a specially constructed arm guard was attached. This guard was firmly fastened to the subject's forearm.

Ergograph Lead: As determined in a former study[5], an essential factor in obtaining satisfactory precision with the ergograph in performing single-bout exhaustive tests is to determine the proper amount of weight for each subject to lift. This amount varies with each individual: the basic muscular strength of involved muscles is the determining factor. For the elbow flexor muscles, the proportion was found to be three-eighths. Thus, if the individual's elbow flexion strength was 80 pounds, 30 pounds was used on the ergograph carriage.

Testing Procedures: A rhythmical, two-second cycle, regulated by a metronome, was used with flexion taking one second and extension one second. Stress was placed on accomplishing a smooth, constant movement; which necessitated lowering the load at the same rate it was raised, with no rest pauses.

Subjects and Testers

Subjects: The subjects utilized in the study were male students at Springfield College. Inasmuch as most of the subjects were physical education majors, they were thought to be physically superior to college students in general. As a consequence, data were collected to define further the physical status of the group. Their median scores were as follows: age, 22 years; weight, 167.0 pounds; height, 69.9 inches; Strength Index, 2787 points; Physical Fitness Index, 105.0 points; and somatotype, dominantly mesomorphic, with some distribution toward ecto-mesomorphy[6].

Testers: The testers were graduate students serving as research assistants in the laboratory. Before they were permitted to record test scores in the experiment, testing competence was assured: First, they were instructed in the testing techniques and practiced testing with available subjects. Then, the testers administered each test twice to the subjects and correlated the results to obtain an objectivity co-efficient. This process continued until all testers achieved agreement equal to objectivity coefficients previously reported for each test.

Experimental Procedures

This experiment was conducted twice, as follows: (1) 1952-53, the number of subjects tested each time varied from 22 to 25; a constant N was not maintained, so that the effects of inconsistencies this introduced were not known. (2) 1953-54, a constant N of the same subjects was maintained for each test period throughout the study. Results obtained from the 1953-54 study will be reported, with some comparisons made with the achievements of the former group.

Cable-tension strength and ergographic endurance tests of the elbow flexor muscles of the left arm were administered to the subjects three times per week for four weeks; similar tests were given following a lay-off of four weeks. In addition, the elbow flexor muscles of the right arm were tested on the first and last days of the four-week period, so as to determine the cross transference of conditioning factors to the unexercised arm. Changes in the strength and endurance of these muscles were determined as an index of the conditioning process occurring under the conditions of the experiment. The technical steps were as follows:

1. The three tests each week were given on Monday, Wednesday and Friday. Thus, at least 48 hours intervened between exercise sessions. Insofar as possible, each subject was tested on the same hour of the day each time.

2. At the beginning of the experiment, strength tests of the elbow flexor muscles[7] were given to the subjects. Three-eighths of each subject's recorded strength was taken as the ergograph load. This amount was kept constant for each subject throughout the study.

3. Each ergographic endurance test continued until the subject was unable to move the load the slight distance required to register on the distance meter.

4. The statistical treatment of these data consisted of a comparison of the means of the strength tests and of the endurance tests for the several exercise sessions. With an N of 28, *t* ratios of 1.71 and 2.48 indicate significance at the .01 and .05 levels of confidence respectively. (6) The standard error formula for the difference between means of correlated groups was used, since the study was a single-group experiment.

[5]Clarke, H. Harrison, "Precision of Elbow Flexion Ergography Under Varying Degrees of Muscular Fatigue," *Archives of Physical Medicine*, 33:279-288 (March) 1952.

[6]Sheldon, W. H., S. S. Stevens, and W. B. Tucker, *The Varieties of Human Physique*. New York: Harper and Brothers, 1940.

[7]Clarke, H. Harrison, *A Manual: Cable-Tension Strength Tests*. Chicopee, Mass.; Brown-Murphy Co., 1953. 32 pp., p. 16.

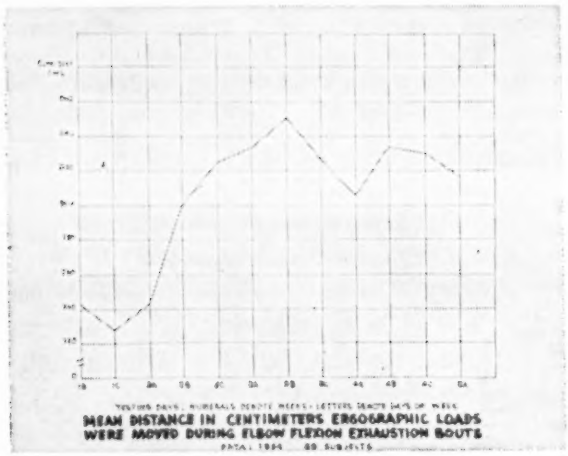

Figure 2

Muscular Endurance Changes

Evidence of changes in muscular endurance was derived from changes in the cumulative distances the subjects lifted the ergographic loads during each exhaustive bout. The mean distances, together with the differences between successive means and their standard errors and *t* ratios appear in Table I. In this table, the test bouts are designated by numeral and letter: the numeral refers to the week; and the letter to the bout during the week. Thus, 3B reads second bout of the third week. Bout 1A was a practice bout and is, therefore, omitted. These same data are portrayed graphically in Figure 2.

TABLE I

Mean Distance in Centimeters Ergograph Loads Were Moved During Elbow Flexion Exhaustive Bouts

(Data: 1953-54; 28 Subjects)

BOUTS	MEANS (cms)	DIFFERENCES BETWEEN MEANS DIFF.	SEd	t RATIO
1A*				
1B	745			
1C	733	-12	16	.75
2A	740	7	20	.35
2B	802	62	23	2.70
2C	823	21	18	1.17
3A	836	13	6	2.38
3B	852	16	15	1.07
3C	833	-19	27	.70
4A	808	-25	20	1.25
4B	835	27	10	2.70
4C	830	-5	16	.31
	Lay-Off of Four Weeks			
5A	818	-12	17	.70

*First day results (1A) are omitted, since this was a practice session

1. During the first week of the study, no increase in the endurance of the elbow flexor muscles was found. For the next two weeks, the gain was consistent and pronounced. Two gains between successive bouts were statistically significant at the .01 level of confidence or nearly so: the 62 cms. from bout 2A to 2B (*t* of 2.70) and the 13 cms. from bout 2C to 3A (*t* of 2.38). Beginning with bout 3C, a decrease in endurance was recorded, continued for two test days and followed by a pronounced gain of 27 cms. (*t* of 2.70). These results are similar to those obtained in 1952-53, except in the earlier study an increase to a greater peak of endurance followed the drop at the end of the third week.

2. The differences between the mean cumulative distances of the first bout (1B) and the subsequent first bouts each week (2A, 3A, 4A) and the final bout prior to the ergographic exercise lay-off (4C) are shown in Table II. With the exception of the first week, the mean cumulative distance increases were significant at the .01 level and beyond.

TABLE II

Differences Between Mean Cumulative Distances Ergographic Weight Loads Were Moved for First Bout and Subsequent First Bouts Each Week and Last Bout Prior to Lay-Off.

(Data: 1953-54; 28 Cases)

BOUTS	SCORES (cms.)	DIFFERENCES BETWEEN MEANS DIFF.	SEd	t RATIOS
1B - 2A	745-740	-5		
1B - 3A	745-836	91	20	4.55
1B - 4A	745-808	63	22	2.86
1B - 4C	745-818	73	25	2.92

3. For the basic four weeks of the experiment, which consisted of eleven exercise sessions, the overall increase in mean cumulative distance achieved by the subjects was 107 cms. at exercise bout 3B, a gain of 13 per cent. For the 1952-53 data, this gain was much greater: 34 per cent at the end of four weeks.

4. Following the exercise lay-off of four weeks, there was very little change in the mean cumulative distance the egrographic loads were lifted. This result is in general accord with other trials of this nature, indicating slight if any muscular endurance deconditioning effects following cessation of ergographic exercise for this length of time.

Muscular Strength Changes

The muscular strength changes resulting from this experimental procedure were determined from the strength tests of the elbow flexor muscles administered to the subjects each test day prior to exercising on the ergograph. The means of strength in pounds pull, together with the differences between successive means,

their standard errors and *t* ratios appear in Table III. These same data are graphed in Figure 3. The designation of the test bouts is the same as in preceding tables.

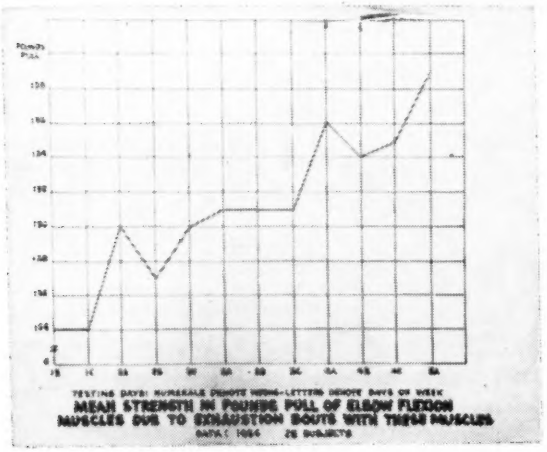

Figure 3

These results may be summarized as follows:

1. The mean strength in pounds pull showed an over-all, consistent rise during the four basic weeks of the experiment. There were three minor drops of one to two pounds, none of which was statistically significant. Two of the successive increases were significant at the .01 level of confidence (1C to 2A, 3C to 4A); and one, at the .05 level (2B to 2C).

TABLE III

Mean Strength in Pounds Pull Prior to Elbow Flexion Exhaustive Bouts
(Data: 1953-54; 28 Cases)

BOUTS	MEANS (Pounds)	DIFFERENCES BETWEEN MEANS DIFF.	SEd	t RATIOS
1A*				
1B	125			
1C	124	-1		
2A	130	6	2	3.0
2B	128	-2	2	1.0
2C	131	3	2	1.5
3A	131	0		
3B	131	0		
3C	132	1		
4A	137	5	2	2.5
4B	135	-2	2	1.0
4C	137	2	2	1.0
	Lay-Off of Four Weeks			
5A	140	3	2	1.5

*First day results (1A) are omitted, since this was a practice session

2. The differences between the mean pounds pull of the first bout (1B) and subsequent first bouts each week (2A, 3A, 4A) and the final bout prior to the ergographic exercise lay-off (4C) appear in Table IV. All of these rises are statistically significant at the .01 level and well beyond.

TABLE IV

Differences in Mean Strength of Elbow Flexor Muscles for First Bout and Subsequent First Bouts Each Week, and Last Bout Prior to Lay-Off
(Data: 1953-54; 28 Cases)

BOUTS	SCORES (Pounds)	DIFFERENCES BETWEEN MEANS DIFF.	SEd	t RATIOS
1B - 2A	125-130	5	2	2.5
1B - 3A	125-131	6	2	3.0
1B - 4A	125-137	12	2	6.0
1B - 4C	125-137	12	2	6.0

3. The over-all increase in mean strength of the elbow flexor muscles for the basic four weeks of the experiment was 12 pounds. The total strength gain, therefore, was 10 per cent, which is approximately the gain for the 1952-53 data (11 per cent).

4. After the four-week lay-off, the muscular strength continued to gain. The amount was three pounds, which is nearly significant at the .05 level of confidence (*t* of 1.5). Thus, no deconditioning effect on muscular strength was evident. Similar results occurred in the 1952-53 study.

Cross Transference of Conditioning Elements

A check on the cross transference of the muscular conditioning elements was made by testing the endurance and the strength of the elbow flexor muscles of the unexercised arm at the beginning and the end of the four basic weeks of the experiment. The results are presented in Table V.

TABLE V

Cross Transference of Conditioning Elements During Four Weeks of Ergographic Exercise
(Data: 1953-54; 28 Cases)

CONDITIONING ELEMENTS	BOUTS First	Second	DIFF.	SEd	t-RATIO
Endurance:					
Distance Load Moved in Centimeters	710	725	15	19	.79
Strength:					
Number of Pounds Pulled	127	140	13	2	6.5

Under the conditions of this study, no appreciable cross transference from the exercised to the non-exercised arm took place in the endurance of the elbow flexor muscles, as reflected in the cumulative distance the ergographic loads were moved. However, in strength, the unexercised arm gained as much

as did the exercised arm, indicating a comparable increase for this conditioning element.

Conclusion

The conditioning effects of ergographic exercise of the elbow flexor muscles, as reflected in changes of the endurance and strength of these muscles, should be interpreted only in terms of the experimental conditions imposed. Thus: The ergographic weight loads were equal to three-eighths proportion of the strength of each subject's elbow flexor muscles; the cadence for each stroke, flexion and extension separately, occupied one second; and exercise continued to exhaustion. As a consequence, the subjects exercised from one and one-half to two and one-half minutes each time; the total length of time each subject actually exercised on the ergograph during the basic four weeks of the experiment is estimated at twenty-five minutes.

Under these experimental conditions, then, the following observations may be made:

1. No increase in muscular endurance was found during the first week of the study; during the next two weeks, there was a steady climb, followed during the fourth week with losses and gains. For the 1952-53 data, a steady rise during the last three weeks of the experiment occurred. The over-all gains were 13 per cent for the current year and 34 per cent for the preceding year.

2. Beginning with the third test day, there was a generally constant rise in muscular strength throughout the balance of the experiment. The over-all gain was 10 per cent, which approximates the gain for the 1952-53 data (11 per cent).

3. No appreciable deconditioning in muscular endurance took place after a four-week lay-off from ergographic exercise. Some gain in muscular strength, however, took place, which was nearly significant at the .05 level of confidence (t of 1.5); similar results were obtained for the 1952-53 study.

4. In studying the cross transference of conditioning elements from the exercised to the non-exercised arm, no gain was found for muscular endurance. However, the gain in strength of the unexercised muscles was the same as for exercised arm.

ACKNOWLEDGMENTS

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THE ROLE OF THE CORRECTIVE THERAPIST IN FUNCTIONAL AMBULATION FOR THE ORTHOPEDICALLY HANDICAPPED

JOSEPH J. PHILLIPS*

The role of the corrective therapist in functional ambulation for the orthopedically handicapped begins at bedside very soon after the patient recovers from traumatic shock.

Initially, a well defined group of exercises should be planned between the physiatrist and the therapist and should include activity of varying degrees of intensity. In our hospital, they are called "post traumatic" exercises, and include such types as therapeutic, resistive, active, active-assistive, and heavy weight resistive; and are generally prescribed for the parts of the body that are not immobilized. When there is a common understanding between the physiatrist and the therapist as to what each exercise type consists of, it enables the physiatrist to write a more complete prescription. The therapist will have a better knowledge of each patient's needs thereby insuring the patient maximum benefit from the exercise program. In any type of exercise program for the orthopedically disabled it is beneficial to the therapist if he is alerted to any precautions, such as cardiac status, arthritis, history of seizures, etc.

As soon as the patient's status changes from bedside to wheelchair and when it is feasible for him to leave the ward, he should come to the clinic for a more diversified and intensified exercise program. Notice of this change of treatment location should be relayed to the physiatrist since it marks the beginning of formal training in prescribed ambulation.

Since non-weight bearing crutch-walking has been discussed many times in the past, I shall confine my remarks on ambulation to the following categories:

A. Braces, thigh, weight bearing type.

B. Prostheses, conventional above and below knee types.

C. Walking casts, thigh type, weight-bearing.

A. BRACES, THIGH WEIGHT BEARING TYPE.

Before the therapist attempts any program of ambulation he must have a good conception of the mechanics of walking. Walking is initiated by inclining the trunk forward until the center of gravity has passed forward beyond the supporting base, bringing about a loss of balance. This is accompanied by a sudden extension of the joints of the supporting leg propelling the body forward and slightly upward. At the same time, the opposite leg is lifted from the floor and swings forward in front of the supporting leg. At the completion of the swing, the leg again touches the floor in a partially flexed position restraining the downward and forward tendency of the center of gravity. The cycle is then repeated with the opposite leg.

The prescription for ambulation on weight-bearing braces should state the degree of weight bearing in percentages; whether the patient is to walk on crutches or cane(s); or without any outside assistance.

The first step is to teach the patient the proper procedures in putting on and removing the brace and the easiest and safest method of getting in and out of his wheelchair. Standing should be initiated in the parallel bars with emphasis on good posture. After this is accomplished, he must be shown how to flex and extend the hip of the braced extremity with good alignment; and if necessary, how to coordinate the elevation of the pelvis during hip flexion with plantar flexion of the ankle on the sound extremity. The patient should be instructed that all ischial bearing braces must be locked at the knee during standing or ambulation unless he is notified to the contrary.

Before any walking is attempted, the patient should be able to balance himself independently on the braced extremity provided that full weight bearing is allowed. Practice in propulsion is done first on the braced extremity and then on the other.

He is now ready to take a few steps in the parallel bars with emphasis on keeping the braced hip extended when weight is borne; properly shifting his body weight; and good stride. If he experiences difficulty in flexing the hip of the braced extremity, a long board (½" thick, 5" wide) can be placed in the center of the platform to elevate his sound leg and allow him to coordinate the walking movements. When the patient develops good balance, gait, and endurance, ambulation is continued outside the parallel bars.

B. PROSTHESES.

All amputees in our hospital are fitted with pylons as a pre-prosthetic management course of treatment. Pylons for the above-knee amputee consist of a celas-

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tic bucket, pelvic belt, trochanteric joint, perpendicular braces, and wooden peg. For the below-knee amputee it has a celastic bucket, knee joints, perpendicular braces, thigh corset, kick strap and pelvic belt, and wooden peg.

As soon as the patient receives his pylon, balancing exercises in the standing position are started in the parallel bars. The appliance is checked for proper length, pressure points, correct ischial bearing (in A/K's) and harness fit. After two or three days of standing and wearing the pylon while in the wheelchair, ambulation in the parallel bars is begun. Except in rare cases (Buerger's Disease, Diabetes, Arteriosclerosis, etc.) crutch walking on the pylon is eliminated. When the patient masters ambulation with a cane in the parallel bars, he is started in the hospital corridors to and from the wards and eventually on grass, rough terrain, ramps and stairs.

While awaiting fitting of the prosthesis, and when it is considered that maximum shrinkage of the stump has occurred, the patient is able to go on extended passes and in some instances, to pursue a gainful occupation.

With the use of the pylon in the pre-prosthetic management of the lower extremity amputee the problems of balance, gait, endurance, stump shrinkage, and stump conditioning are overcome by the time the patient receives his prosthesis. For the above-knee amputees, the only training necessary is coordinating knee and hip flexion and extension. Below-knee amputees need only to get accustomed to the foot action of their prostheses. Rough terrain, stairs, curbs, and ramps do not present any particular problem.

Sometimes locomotion difficulties occur because the patient does not put on his prosthesis properly or because the appliance is ill-fitted or misaligned. I shall try to elaborate on some of the common complaints of amputees that cause poor gaits and discomfitures and how in most cases they can be corrected:

1. Above-Knee Prosthesis

Prosthesis too long.

Check to see that the stump is in the socket all the way with proper ischial bearing. Prosthesis should be the same length as the sound extremity as measured from the anterior superior spines. Older amputees sometimes complain vigorously of the prosthesis being too long because they have difficulty in clearing the ground during swing-through. This can usually be corrected by placing the ½" board previously mentioned in the center of the parallel bars to elevate the sound extremity and enable the patient to coordinate elevation of the pelvis with hip and knee flexion on the prosthetic side with plantar flexion of the ankle on the opposite extremity during propulsion.

Pelvic belt may be slipping down over the flank.

Shoulder harness in addition to the pelvic belt usually corrects this condition.

Undue pressure on the crotch or buttock.

Stump going into the socket too far due to shrinkage allowing ischium to go beyond the ischial seat.

This condition can be corrected by adding a light stump sock. If excessive, it may necessitate re-lining the socket.

Pain in the lumbar spine.

This condition may be caused by the prosthesis being too short or too long; or due to excessive lateral shift of the superincumbent load toward the sound extremity.

Abduction of the stump in flexion.

Pelvic belt may be worn too tightly.

Trochanteric joint placed *over* the trochanter. (Should be 1½" anterior to it.)

Abduction of the stump in flexion.

Metal portion of the pelvic belt does not fit the contour of the body.

Trochanteric joint placed too far anteriorly.

Rotation of Prosthesis.

Pelvic belt worn too loosely.

Limitation of dorsiflexion of the foot.

Trochanteric joint not placed in proper axis.

2. Below-Knee Prosthesis

Pain in stump at the level of the anterior border of brim.

Insufficient motion in dorsiflexion of the foot.

Pressure on the patella.

Patient's stump going into the socket too far. Add an extra stump sock.

Stump slipping out of stocket during knee and hip flexion.

Corset and kick strap too loose.

Limited knee flexion and constriction in the popliteal space on sitting.

Excessive number of stump socks.

Lower posterior border of thigh corset not cut away sufficiently.

Hinge joint of the knee not properly aligned.

Stump Rotation in socket.

Insufficient degree of dorsiflexion of the foot.

Leather thong on the posterior aspect of the thigh corset does not have free play through the eyelets.

Difficulty in fully extending the knee; or, knee going into hyperextension.

Leather thong on posterior aspect of the thigh corset too tight; or too loose.

C. THIGH WALKING CASTS.

Thigh walking casts present almost identical ambulation problems as do thigh braces except that the patient has more difficulty getting accustomed to the heel-toe action of the "walker" and the immobility of the ankle.

One of the most difficult types of patients for A.D.L. activities is one with a long single hip spica.

It is most satisfactory for this type of patient to come to the clinic on a litter. He must first be taught to turn from supine to prone position and return with ease and without fear of falling from the litter.

The best method of getting the patient to a standing position is to move the litter to the open end of the parallel bars with the patient in a prone position, feet first. He pushes himself off the litter until the free foot touches the floor and as this contact is made, he grasps both bars and pushes himself up to a standing position. (The therapist should be alert to prevent the litter from tipping during this operation.) The litter should be left in position in case the patient develops bouts of dizziness or blackouts. The return to the litter is done in reverse order, the patient using his hands and free foot to propel himself onto the litter.

After the patient can stand with good balance, ambulation can be started in the parallel bars with emphasis on the four-point alternate gait. Eventually, crutch walking can be initiated outside the parallel bars, starting with the four-point alternate gait, graduating to the two-point alternate gait, and thence to a cane.

As soon as ambulation is mastered outside the parallel bars, the patient must learn a new method of getting on and off the litter from the side, mounting with the full spica first and dismounting with the free foot first. This procedure is always done from the prone position.

When ambulation is perfected to a point where the patient can walk from the clinic to his bed on the ward, the therapist walks him to bedside and teaches him to get in and out of bed in the same manner as on and off the litter. The patient should then be encouraged to walk to and from the clinic for further training in ambulation.

CONCLUSIONS:

1. In any ambulation program safety to the patient first and the therapist second is of utmost importance. The therapist must constantly be on the alert against taking chances that may result in the patient falling.

2. Fatigue and tolerance of the patient must be regarded closely. Too much activity on the first few days will retard the patient's progress.

3. The patient must have the utmost confidence in the therapist's ability to cope with any unforseen circumstances or obstacles. Most difficulties will be eliminated if the patient thoroughly understands the techniques of ambulation while confined to the parallel bars.

4. Good posture cannot be stressed too greatly—efficiency in ambulation depends on it.

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EFFECTIVENESS OF HYDROGYMNASTICS THERAPY IN TREATING THE ACUTELY DISTURBED PSYCHOTIC

JOHANNES TIMMERMAN*

Introduction

This is a survey of hydrogymnastics and four other types of psychiatric treatment taken from the clinical files of twenty-five male psychotic patients of the Veterans Administration Hospital, Downey, Illinois.

Among the few available references on hydrogymnastics for the acutely disturbed psychotic there is a report by Knudson[1] revealing information received from various Veterans Administration Hospitals that an activity program which includes hydrogymnastics contributed materially to the reduction in the number of tubs, packs, and chemical sedations treatments for this type of patient. Other pertinent references[2,3] center around the sedative effect luke-warm water has on the patient. This paper confirms some of the findings of these publications by presenting data which compares the regular sedative effects of hydrogymnastics with the results obtained when this type of treatment was interrupted for some time.

In this paper data are reported on hydrogymnastics and four other types of psychiatric treatment, namely chemical sedation, shock, hydrotherapeutic sedation, and seclusion. Hydrogymnastics for the disturbed psychotic patient were administered by the corrective therapy section personnel and the four other types of psychiatric treatment were administered by other hospital personnel.

All patients for the prescribed hydrogymnastics came from the same building. About fifty per cent or nearly sixty patients of this building were on the hydrogymnastics list. For each hydrogymnastics period either twelve or sixteen patients were selected from the list and escorted to and from the standard size former Navy pool, a quarter of a mile away, by hospital bus with a corrective therapist in charge.

An interruption in hydrogymnastics therapy occurred from February to July as the result of repair to the swimming pool basin. Because none of the patients had received this treatment during these five months, an excellent opportunity presented itself to evaluate the relative effectiveness of hydrogymnastics as it applied to acutely disturbed psychotic patients.

Procedure

As part of the survey procedure, criteria were set up that would yield a large enough number of subjects who had been prescribed hydrogymnastics therapy for a sufficient length of time to validate the study.

The following criteria were arbitrarily chosen and all male patients who could meet these criteria became automatically subject for the survey:

(1) Have a psychotic diagnosis;

(2) Have *not* received a psychosurgical operation;

(3) Have been on the hydrogymnastics list for at least six consecutive months of which three months coincided with the repair-to-pool period.

Twenty-five patients met these criteria. The clinical records of these twenty-five patients were reviewed in order to compile records of the number of each type of psychiatric treatment under study during the six months period pertinent for each patient. The six months pertinent to the thirteen patients listed first on the table of figures consist of three months immediately prior to the repair-to-pool period and the first three months of the repair period. For the remaining twelve patients the pertinent six months were the last three months of the repair-to-pool period and the first three months immediately following the repair period.

For example, the record of patient No. 12 as listed in Table I shows the following treatments immediately prior to the repair period: hydrogymnastics on forty-six different days, chemical sedations on seven different days, shock on eleven different days, and hydrotherapeutic sedations on twelve different days. During the following three months this patient received chemical sedations on ten different days and hydrotherapeutic sedations on twenty-eight different days.

In this survey the same credit was given to treatments regardless of amount, duration, or frequency if administered on the same day (midnight to midnight). For instance, if a patient were placed in seclusion once, received hydrogymnastics in the morning as well as in the afternoon and received three chemi-

*At the time of this survey, the author was Chief, Corrective Therapy, Veterans Administration Hospital, Downey, Ill. He is at present Chief, Corrective Therapy, Veterans Administration Hospital, Roanoke, Va.

[1] A. B. C. Knudson, "Reduction of Tubs and Packs Through Activity Programs in the Veterans Administration," *Veterans Administration, Dep't of Medicine and Surgery, PMR Div., IB 10-48*, Oct. 1953, p. 4 et. seq.

[2] Simon Baruch, *An Epitome of Hydrotherapy*, W. B. Saunders Co., 2nd Edit., 1950, p. 89.

[3] George M. Piersol, *Handbook of Physical Medicine and Rehabilitation*, Blakiston, 1950, p. 193.

cal sedations all on the same day, this survey afforded only one credit each to seclusion, hydrogymnastics, and chemical sedation.

For the purpose of this study four types of psychiatric treatments, namely seclusion, chemical sedation, shock, and hydrotherapeutic sedation were grouped together into one unit and are hereafter called "combined treatments."

Treatment terms used in this survey are defined as follows:

Hydrogymnastics—Therapeutic swimming including swimming and diving, jumping, imitating various demonstrated swimming strokes, playing catch with inflated balls, "shooting baskets," and other informal activities performed in the water.

Seclusion—Confinement to a room in which the patient is by himself.

Chemical Sedation—The administration of any of the following drugs for sedative purposes: paraldehyde, sodium amytal, sodium luminal, dilantin R, thiantoin R and phenobarbital.

Hydrotherapeutic Sedation—The application of neutral wet-sheet packs or the use of continuous flow tubs for sedative purposes.

The results of the survey are shown in Tables I and II and are summarized in Fig. 1.

Table I gives the basic data on each of the twenty-five subjects. These columns are headed by the terms, "closed" or "open." These terms indicate the non-

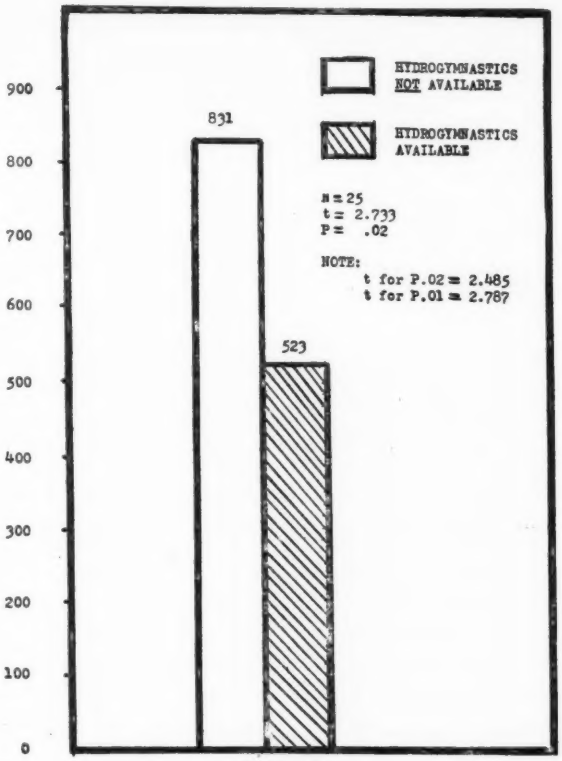

Figure I
Comparison of Combined Treatment Administered when Hydrogymnastics *were* and *were not* available.

TABLE I — BASIC DATA

Patient No.	A Swimming	B Sedation		C Shock		D Seclusion		E Hydrotherapy		F Combined Sedations		G Difference
	Open	Closed	Open	Closed	Open	Closed	Open	Closed	Open	Closed	Open	
1	61	0	0	0	0	0	0	4	0	4	0	4
2	19	84	88	0	0	0	0	2	6	86	94	— 8
3	33	31	0	2	9	0	0	12	1	45	10	35
4	44	0	2	6	0	0	0	12	0	18	2	16
5	45	1	1	0	0	0	0	2	0	3	1	2
6	28	7	2	0	0	0	0	1	2	8	4	4
7	37	11	0	0	0	0	0	2	0	13	0	13
8	36	2	0	10	0	0	0	33	4	45	4	41
9	53	0	0	5	0	0	0	0	4	5	4	1
10	49	4	0	0	0	0	0	64	24	68	24	44
11	30	0	0	0	0	0	0	2	7	2	7	— 5
12	46	10	7	20	11	0	0	28	12	58	30	28
13	14	34	14	0	0	0	0	59	24	93	38	55
14	40	1	1	0	0	0	0	0	0	1	1	0
15	33	0	0	0	0	0	0	0	0	0	0	0
16	19	1	1	2	2	0	0	9	37	12	40	—28
17	37	87	21	0	0	6	0	12	53	105	79	26
18	24	0	0	1	0	0	0	0	0	1	0	1
19	8	37	4	0	3	15	1	12	13	64	21	43
20	37	0	0	0	0	0	0	7	8	7	8	— 1
21	23	14	41	2	0	6	0	62	67	84	108	—24
22	20	3	0	0	0	0	0	0	0	3	0	3
23	37	1	0	0	0	0	0	75	25	76	25	51
24	16	2	0	6	0	0	0	14	18	22	18	4
25	14	5	0	1	5	0	0	2	0	8	5	3
Totals	802	335	182	55	30	27	1	414	310	831	523	374 —66

availability or the availability of the swimming pool for hydrogymnastic therapy.

TABLE II

Variety and Frequency of Chemical Sedation

	Pool Closed	Pool Open
Paraldehyde	36	2
Sodium amytal	129	87
Sodium luminal	22	0
Dilantin R	101	89
Thiantoin R	45	3
Phenobarbital	2	1
	335	182

Variety of chemical sedations and the number of each variety administered to subjects during periods pool was closed or open to hydrogymnastics therapy. All listed drugs have a sedative effect and it should be noted that all these drugs were available during the time of this survey.

Figure I gives a comparison of the number of combined treatments administered when hydrogymnastics was available and when it was not available. The shaded column represents 523 combined treatments accumulated by the twenty-five subjects over a three months' period during which time hydrogymnastics was available. The unshaded column represents 831 combined treatments administered over the same length of three months during which period hydrogymnastics was not available.

The data of this survey were analyzed and the *P* value of less than .02[5] indicates a statistically significant difference exists between the two contrasting three month periods. It is logical to assume that the availability of hydrogymnastics therapy contributed substantially to the reduced necessity for the other types psychiatric treatment.

In discussing this survey the question could be raised as to whether the number of combined treatments decreased as the number of hydrogymnastics treatments progressively increased. Our data do not lend themselves to provide information on this question. It is suggested, however, that this problem is worth further study.

Proper recognition should be given to certain factors having a bearing upon the outcome of this study. These are among others: (1) the unequal availability of the five mentioned types of psychiatric treatment; hydrogymnastics were available nine periods a week from Monday through Friday; hydrotherapeutic sedation was available seven days a week, sixteen hours a day, shock, seclusion, and chemical sedation was available daily around the clock; if hydrogymnastics had been available on a more liberal basis, it is conceivable that this treatment would have been selected instead of chemical sedation or one of the other types of combined treatment group; (2) the water temperature was kept between 85° F and 95° F and usually near the 90° F mark; (3) the patients were in the water for about one hour in the morning and one and one-half hours in the afternoon. Occasionally, one or two patients were on the decks for a few minutes and then rejoined the group; (4) ample safety measures were taken during each hydrogymnastic session, ensuring that no more than four patients were assigned per therapist and two members of the corrective therapy personnel were on the decks at all times with buoys and rescue poles within easy reach; (5) of great importance, and probably the greatest factor for consideration, is the increase in the number of corrective therapy periods (from two to five periods a week during the length of time the pool was closed for repairs). This type of corrective therapy was mainly of a resocialization nature carried out in the corrective therapy clinic or, weather permitting, on the outdoor area adjacent to the patients' building.

The size of these resocialization groups averaged about twenty-five patients and no attempts were made to keep the swimming list patients separate from the others. There were usually one corrective therapist and one or two aides with the group. If this increase in the number of corrective therapy periods had not taken place during the repair-to-pool period it is possible that the number of combined treatments would have been even greater.

Summary

Twenty-five disturbed male psychotic patients received a total of 831 combined treatments (namely seclusion, shock, hydrotherapy, and chemical sedations) during a period that patients were unable to receive hydrogymnastics therapy. These same twenty-five patients received 523 combined treatments over the same length of three months during which time hydrogymnastics therapy was available. The difference between the contrasting three months is statistically significant beyond the .02 level. It was concluded that availability of hydrogymnastics therapy contributed substantially to the reduced necessity for the other types of psychiatric treatment.

The author is indebted to Dr. Edward Greenwood, Topeka, Kans., Dr. A. B. C. Knudson, Washington, D. C., and Dr. Warren W. Webb, Roanoke, Va. for their valuable suggestions. However, the results or conclusions drawn are those of the author.

GIVE TO THE SCHOLARSHIP FUND

WE INTRODUCE

MAJOR GENERAL MELVIN J. MAAS

General Maas was elected to the Advisory Board of the Association for Physical and Mental Rehabilitation in July, 1954.

For nearly forty years, Melvin Maas has been serving this nation in an important capacity; as a Marine combat leader, as a Congressman, as a leader in rehabilitation, he has adapted himself to a varying set of demands and achieved singular success.

Beginning in 1917 when he saw wartime service as a private in the Marine Corps, General Maas' life has been intimately associated with that branch of our armed forces. He was commissioned in the reserves in 1926 and shortly thereafter won election to Congress from the State of Minnesota at the age of 27. Serving in Washington from 1927 to 1933 and again from 1935 to 1945, Congressman Maas specialized in legislation promoting the causes of aviation, national defense and measures designed to combat unemployment. He was a member of the House Foreign Affairs committee and helped to sponsor several conferences designed to improve our relations with other nations. He personally authored the Naval Reserve Act of 1938 and sponsored legislation to fortify Guam well before the onset of World War II.

While still a member of Congress in 1941, he returned to active duty in the Marines and served on the staffs of Admirals William Halsey and Frank Fletcher in the Solomons campaign. He served as an observer with General Douglas MacArthur in Australia and New Guinea, and won both the Silver Star and Legion of Merit for combat service in the Pacific. In the fall of 1942 he resumed his duties in Congress but returned again to active duty in January 1945. In May of that year, as commander of the Awase Air Base, Okinawa, he was severely wounded by enemy action. He was promoted to Brigadier General in the Marine Reserve in June, 1950 but progressive blindness overtook him and he was retired from service in August 1952 as a Major General for having been specifically commended in combat.

On September 18, 1950, General Maas was named chairman of a special committee to clarify the status of thousands of Army, Navy, Air Force and Marine Reserves during the limited mobilization. For his untiring efforts in behalf of the Marine Corps Reserve program, he became known as "Mr. Marine Corps Reserve.' 'He continues to serve on the policy board and is chairman of the Board of Directors of the Marine Corps Reserve Officers Association, legislative chairman of the Reserve Officers Association of the U.S. and Past Commander-in-Chief of the Military Order of the World Wars.

General Maas was an original member of the President's Committee on Employment of the Physically Handicapped and was appointed Chairman of the committee on April 13, 1954 following the resignation of Admiral Ross T. McIntyre. A citation presented to him in June, 1954 when he accepted an honorary degree of Doctor of Laws from his alma mater, the College of St. Thomas, St. Paul, Minn. perhaps best sums up his long career. Dealing on that portion of his life following World War II, the citation read: "It has been, however, during the years since V-J Day that the richest vein of heroism in General Maas' makeup has been tapped: the noble fortitude with which he has relinquished sorely-needed rest to serve his country in enormously demanding tasks. After the Korean War broke out, Secretary of Defense Marshall asked him to return to active duty to revise the entire Reserve program. In 1953 the President appointed him Vice Chairman to his Committee on Employment of the Physically Handicapped; last April he was made Chairman of that Committee. In this assignment, which may prove to be the most important he has ever undertaken, he will continue to demonstrate the kind of courage which nourishes whole communities."

"From Other Journals"

CARLETON B. CHAPMAN and ROBERT S. FRASER, "Studies on the Effect of Exercise on Cardiovascular Function. III. Cardiovascular Response to Exercise in Patients with Healed Myocardial Infarction," *Circulation*, IX:347-351, March, 1954.

Nine men who had sustained a myocardial infarction at least six months before the test and were asymptomatic were tested for 10 minutes on a motor driven tread mill and compared with 12 men of similar age who showed no evidence of cardiovascular disease. Cardiac output, cardiac index, resting mean circulation time, average decrease during exercise, and changes in blood pressure were similar for the two groups. Changes in pulse rate during exercise were significantly greater in the patients than in the normal subjects. This probably reflects the fact that the patients had been physically less active in the months before the test than had the normal subjects. The test provides no support for the view that marked restriction of activity is physiologically necessary in patients of this type.

PJR

M. B. MCILROY, R. MARSHALL and R. V. CHRISTIE, "The Work of Breathing in Normal Subjects," *Clinical Science*, 13:127-136, 1954.

The work of breathing was studied in ten normal male subjects. The work of respiration at rest lies between 0.19 and 0.46 kg. m./min. (mean 0.29). This is about 1% or 2% of the total resting metabolism. During quiet breathing about 70% of the work expended is exerted against the elas-

(Continued on Next Page)

tic resistance of the lungs and the remainder in overcoming the non-elastic resistance. Work required to maintain a given volume is increased with slow deep breathing and the subject's usual respiratory rate lies in the region of greater efficiency. Max mum work possible is about 80 kg. m./min. On exercise, the work of ventilating the lungs increases linearly with the increase of minute volume.

PJR

T. H. HETTINGER and E. A. MUELLER "Muscle Capacity and Muscle Training," *Arbeitsphysiologie,* 15-111-126, October, 1953.

Is there a relationship between the amount of strength exerted and/or the length of time used in physical exercises on the one hand and the length of time required to produce an increase in muscle strength on the other hand? In order to find an answer to this and other questions the authors conducted for eighteen months some experiments, in which nine male subjects ranging in age from 21 to 37 years, participated. With the aid of a modified dynamometer, readings of isometric contractions were obtained of the elbow flexion and extension actions by five subjects; forearm pronation actions by two subjects; and twenty other muscle group actions by the remaining two subjects.

One subject exercised the extensor muscles of the right elbow at 33% of maximum strength for 75 seconds and the left counterpart at 80% of maximum strength for 10 seconds. After twenty weeks of these daily exercises the strength increase was practically the same for both sides. A similar experiment showed nearly identical improvements as the result of twenty weeks exercising the flexors of the right elbow at 67% of maximum strength and the left counterpart at 75% of maximum strength. Turning now to the length of time used for each exercise; a six-seconds' exercise of the right elbow flexors yielded nearly the same results as a 34-seconds' exercise of the left counterpart, after twenty weeks of daily sessions. Exercising the right elbow extensors for 45 seconds and the left counterpart for 22.5 seconds on a daily basis for twenty weeks, resulted in the same amount of strength increase for both sides. The weekly strength increase for exercises at 67% of maximum strength for six seconds duration, is somewhere between one and two kilogram. Lengthening each exercise session does not produce a strength increase at an earlier date. The adaptive behavior of muscle fibers plays probably an important role in this matter.

J.T.

J. H. HICKS, "The Mechanics of the Foot II," *Journal of Anatomy,* 88:25-30, January, 1954.

Although the association of arch rising with toe extending is recognized by orthopaedic surgeons, no attempt has been made to explain it. In the weight-bearing normal foot, passive extension of the big toe at the metatarso-phalangeal joint will be observed to result in the arch appearing to rise. When the toes are extended, the phalanx, sliding on the dorsum of the metatarsal head, pulls after it the plantar pad, which comes anterior to the metatarsal head, and this in turn pulls upon the attached process of the plantar aponeurosis, the arch thereby being shortened and raised. When the plantar aponeurosis is cut across this arch-raising action almost disappears. The mechanism functions each time a step is taken during the phase when the foot is rising on to the toes, the toes being extended by pressure against the floor. No muscle is concerned in the mechanism, which is entirely bony and ligamentous. The new concept which emerges is that arch-raising is not necessarily the result of action by arch-raising muscles, but is a movement that must occur in every foot every time the toes are extended. This must not be taken to imply that muscles never have an action on the arch.

PJR

J. H. HICKS, "The Mechanics of the Foot, I," *Journal of Anatomy,* 87:345-357, October, 1953.

Experiments on amputated legs show that all movements in the foot are rotations. Each foot joint is a hinge whose plane of movement is predetermined by its own intrinsic structure. In natural conditions rotations occur at the ankle (two axes), the talo-calcaneo-navicular, the mid-tarsal (two axes) and the five ray joints. When the foot is free the movements at these joints may be summarized as follows: the whole foot undergoes flexion and extension upon the fixed leg; (the flexion is accompanied by slight supination and the extension by slight pronation); the part distal to the talus in addition undergoes pronation-abduction-extension-supination-adduction flexion; the part distal to the mid-tarsal joint in addition undergoes (approximate) pronation supination; the forepart of the foot in addition undergoes a pronation-supination twist. The conditions of standing impose a constant relationship between the plane of the metatarsal heads (horizontal) and the tibia (near vertical), so that any movement at one of the intervening joints must be neutralized by an opposite movement of the other.

PJR

ALAN ROOK, "An Investigation Into the Longevity of Cambridge Sportsmen," *British Medical Journal,* 4865:773-777, April 3, 1954.

The doctor called upon to advise about participation in strenuous sports must answer at least two questions: Can these exertions directly damage any organs particularly the heart? Does exertion cause trouble in later life which may result in premature demise? There is general agreement that strenuous exertion has no immediate ill effect on the normal heart. The records of 772 Cambridge graduates who had been athletes were compared with those of 374 men who had won academic honors and with a random group of 336 men who had won distinction in neither field. The intellectuals lived on the average nearly two years longer than the random group and one and a half years longer than the sportsmen. There was some evidence that lightly built men tend to survive longer than did the heavily built men. There was no evidence that sportsmen are more likely to die from cardiovascular causes than are the controls, nor are they affected at an earlier age. The suicide rate among intellectuals was decidedly higher than among sportsmen or the random group.

PJR

N. B. STRYDOM, "Some Physiological Aspects of Adaptation to Heat," *South African Medical Journal,* 28:112-113, February 6, 1954.

In the mines of Witwatersrand temperatures may be as high as 120 degrees F., and the air is very humid. During the laborer's acclimatization process physiological changes take place. There is an increased peripheral blood flow giving better cooling; an adjustment of blood pressure; an increase in blood volume; a slowing of the pulse rate; a decrease in metabolic rate resulting in a lowering of body temperature; an adjustment of water and mineral exchange. To make these changes a man must work hard; sitting in heat does not have any beneficial effect. Inadequate acclimatization is dangerous when work is to be done in saturated environments of 87 degrees F and above. Acclimatization for the mines takes twelve days.

PJR

"Coloured Driving Classes," *British Medical Journal,* 4874:-1313-1314, June 5, 1954.

Some drivers have taken to wearing yellow-tinted glasses at night to reduce glare from on-coming headlights. There is nothing to be said in favor of this. A clear-glass windscreen transmits 92% of light falling on it. The lightest yellow filter passes about 88%. A combination of both will pass only 81% under ideal conditions, and considerably less in the presence of dirt and scratches. Visual acuity, resolving power and stereoscopic acuity fall when using these lenses. They are particularly disadvantageous to color defectives.

PJR

Editorials

CHRISTMAS MESSAGE

Since it would be an impossibility to personally meet or contact each member of the association before the yuletide season, I would like to convey, on behalf of all officers of the organization, our best wishes for a very Merry Christmas and a Happy and Prosperous New Year.

To corrective therapists, I have this special message: the spirit of Christmas is based upon love of your fellow man. The age-old tradition of giving exemplifies this feeling. All of us are in a unique position whereby we are practicing daily this spirit of giving—not a gift of monetary value but one far more precious. This is the gift of our knowledge, our skill, and our desire to help our fellow man during his greatest hour of need. It is a gift I am sure we would all look forward to receiving if we were placed in a similar situation. It is also one that will be everlasting to those individuals who are entrusted to our care and one that will have a significant meaning to all of us now and in the foreseeable future.

Let us continue to reflect that the spirit of Christmas should not be with us only on December 25 but that it should be with us on each and every day as we corrective therapists perform our task of helping those who need, look for, and are entitled to our help.

Louis F. Mantovano, President,
The Association for Physical
and Mental Rehabilitation

USING THE JOURNAL INDEX

Although the annual Subject-Author Index can be a useful reference to the reader, it is hoped that it will also serve as a guide to those who contemplate contributing articles for publication in this journal.

Professional literature may be divided loosely into two categories; one dealing with the fundamental scientific principles of exercise and its relationships and the other to the techniques utilized in the administration of these principles. Although we look to the doctor and the medical scientist to elaborate in our literature on the fundamental bases for our discipline, the area of applied techniques is the primary concern of the therapist and represents a very large field for the selection of topics upon which to base a professional article.

Applied techniques may refer to specific types of disability, to specialized treatment programs, to particular exercise modalities, or to new devices utilized within the framework of corrective therapy.

Although it is not our purpose here to discuss the subject at length, technical articles should be as complete as possible, be based upon established scientific principles and research, be illustrated wherever feasible, contain annotated references and methods of evaluation used to determine the efficacy of the particular technique under discussion.

If we think of professional growth in terms of advancing knowledge of applied techniques, we must realize that this growth can be measured only by its influence on current literature in the field. The editors of this publication are most anxious to assist all therapists who wish to contribute to the technical advance of the profession and welcome all queries in relation to the preparation of professional papers.

THE SCHOLARSHIP FUND

If there is any single factor that can assure the future of Corrective Therapy, it is the guarantee that competent and well-trained young men and women will continue to embark upon careers in this field.

In an effort to maintain its high standards and draw the attention of worthy students to the advantages of making Corrective Therapy their life's work, the Association for Physical and Mental Rehabilitation has undertaken steps to institute a scholarship fund, the details of which appear elsewhere in this issue.

We are certain that all members of the association will agree on the timeliness and worth of this important project but mere agreement is not enough. The implementation of this project requires the cooperation of all members, individually and collectively through the various chapters, in order that the first year's goal can be realized.

A CHALLENGE

Some thirteen colleges and universities are now training physical education men and women in the field of corrective therapy. The demands for these specially trained people far exceed the supply. The salaries offered in this field are considerably higher than in related fields. The opportunities and challenges of this type of work make it most attractive. In spite of these facts, the enrollments in training courses are not filled. Unless the membership of the Association takes the initiative and makes a determined effort to recruit new people for the field, the whole profession will suffer. Therefore, we are proposing that each member make a determined effort to recruit at least one new prospect for training. If every member takes this request seriously, the future of the field will be considerably strengthened. C.W.M.

Research

ALTER UND LEISTUNG (Age and Efficiency) By ERNST JOKL, M.D., SPRINGER PUBLISHERS, HEIDELBERG, GERMANY 1954.

The author, Professor of Physical Education and Director of Rehabilitation at the University of Kentucky, spent several months in Germany during 1952 to conduct a Government-sponsored study of health and physical efficiency of 1609 men, age 40-84, and of 98 women, age 32-52 who participated in the Annual National Gymnastic Festival for the Old in Marburg.

Jokl emphasizes the need for quantitative evidence in the study of human efficiency. The Gymnastic Festival for the Old in Marburg represented an unusually favorable opportunity for a scientific analysis: The ages of the participants were known; the apparatus exercises had been precisely laid down for the various age groups; each performance was adjudged in accordance with standards of execution; and track and field events (sprinting, putting the shot and jumping) were evaluated in terms of a point scale so as to render them comparable to the results of the apparatus competitions. The entire data for every gymnast—medical, social and physiological—were coded on punch cards. The technique of using the well known IBM (Hollerith) machines for studies of this kind is explained in detail.

The first result of this research is that the life-long physical exercise program which these subjects had followed namely, apparatus gymnastics plus light games and some track and field training not only developed high standards of physical efficiency but also maintained them in middle and old age. Fig. 1 shows the compulsory exercise on the horse for men age 50-59, as performed by 492 participants; fig. 2 shows the compulsory exercise on the parallel bars for men, age 60-84, as performed by 584 participants; and fig. 3 shows the compulsory exercise on the horizontal bar for women age 32-52 as performed by 91 participants. The evidence proves that a well trained gymnast of 70 is likely to be superior in respect of almost all acquired motor activities to an untrained man of 20. Jokl points out that his observations corroborate several important findings of T. K. Cureton to which he draws attention.

The gymnasts on whom this study was conducted comprised an age group which, according to morbidity and mortality statistics for the general population, would be expected to be affected more than younger age groups by degenerative diseases of the cardiovascular system; by neoplastic growths; and by kidney ailments. The absence of the disabling sequelae of these conditions among the gymnasts is noteworthy. In addition to the favorable standards of physical efficiency and of health there was in evidence a remarkably high level of physique and strength.

These findings raise the following question: does life-long physical training exert a powerful influence that inhibits the aging process on a broad physiological front, including the decline of physique, the decline of efficiency and the decline of health? Jokl answers the question in the affirmative. He stresses that in regard to health this observation introduces an entirely new clinical concept into physical education; because morbidity and mortality of the *younger* age groups are definitely not affected the one way or the other by exercise, primarily because training does not influence the immunological resources of the body; and, at least until a few years ago, the infectious diseases were the most important causes of illness and death up to 30 years of age.

Data are reviewed which show that the rapid increase of longevity which has taken place in Europe and in the United States during the past 50 years or so has been accompanied by a general lengthening of the period of optimal usefulness of men and women. Today people maturate younger—menarche in girls occurs 5 years earlier than in 1875—and age later. This trend is accentuated by regular physical training, providing it is continued throughout life.

A critical analysis of the results of the last 3 Olympic Games and of other sporting events of the past 20 years or so reveals that more and more very young, and more and more middle-aged and old men and women now compete successfully in various contests with athletes in their late teens and in their twenties. Until 3 or 4 decades ago the latter age groups virtually had a monopoly of record performances in athletics and sports.

Among the medal winners at the 1948 Games in London was the 16 year old Japanese discus-thrower, Ko Nakamura; the 18 year old apparatus gymnast, Anita Barwirth; and the 17 year old decathlon world record man, Bob Mathias. Twelve year old Inge Sorensen came third in the 200 M breast-stroke final. Maureen Connolly was 15 when she won her first American tennis title. For each of these cases several corresponding instances have been quoted. As regards the older age groups, Dr. Savolainen of Finland won a bronze medal in the horizontal bar competition at Helsinki in 1952 at the age of 45; the Swiss 10 km walking champion, Schwab, was 48 at the time of his start at the 1948 Games; the third winner in the 50 km walk, Johnson of Great Britain, was 48; the second in the marathon was 48; the hurdler, Finlay, was

40. The French tennis champion, Borotra, born in 1898, was finalist in two international tournaments in 1954. When he was 47, Tilden beat the 24 year old champion, Don Budge.

The process of maintaining resources, or even of unfolding new resources of physical strength after age 40, 50, 60 and 70 is still going on, i.e., the period of fitness lengthens continually. Impressive performance records are included which indicate the validity of this statement for feats of endurance and of skill. (Fig. 4 and 5.)[1] Performance records from the German Gymnastic Festival for the Old in Cologne in 1928 were compared with the 1952 results for identical age groups in Marburg. (Fig. 6.)[2] In spite of the misery of the war a categorical improvement of performances has taken place between 1928 and 1952, corresponding to a collective retardation of aging by an equivalent of 6-10 years.

The economic significance of prolonging physical fitness of the aging population is shown with the help of the standard income tables prepared by the New York Metropolitan Life Insurance Company. Jokl's conclusion is the same as that stated recently by Dr. Rusk in his comment on Congress's courageous decision to increase the budgetary provisions for medical research for the current year. Namely, that in our manpower we possess a national resource that can be better utilized than has so far been the case.

The following figures indicate the magnitude of the problem under review for this country. Between 1944 and 1952 medical research and improved medical education and rehabilitation have reduced the death rates from all causes by 9.4 per cent. Five full years have been added to the average life expectancy. As a result of these ond other advances the lives of 845,014 Americans have been saved in the last eight years. They earned and added $1,488,000,000 to the national income and excise tax receipts. A corresponding and even greater material advancement, Jokl demonstrates, can be achieved by prolonging the fitness of the aging population, enabling them to continue working and postponing the period of dependence upon family or public support. Indeed, a new, unexpected and fascinating task presents itself to the profession!

We therefore have to continue the battle not only against illness but also against premature inroads made by aging. That judiciously applied physical training can inhibit aging by many years, and that the material welfare of the nation and the happiness of the people can thus be enhanced is shown by this research publication.

Dr. Carl Diem, President of the Sporthochschule in Cologne, and Dr. W. Kolb, President of the German Gymnastic Union, have written appreciative prefaces to the book.

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[1]Age distribution of champion performers in ski-jumping, combination ski competition, 10-18 km race, 30-50 km race, lumber jacks. With increasing age, endurance improves and speed regresses in highly trained subjects. (After Karvonen.) Qualitative evaluation of individual performances in terms of points awarded. It is apparent that regular training enables the gymnasts to maintain a high level of precision of motor performances up to 70 years and above.

[2]Comparison of performances in 75m race; shot put; and broad jump of men age 40-50 at the "Turnfest" in 1928 and in 1952. A categorical improvement has taken place between 1928 and 1952 corresponding to a collective retardation of aging by an equivalent of 6-10 years.

Book Reviews

"Corrective Physical Education," by Josephine Langworthy Rathbone, Fifth Edition (Philadelphia: W. B. Saunders Company, 1954. 318 pp. $4.50).

At first glance this appears very similar to the earlier editions, although published in a much better format, considerably enlarged and far more attractively bound. There are, for instance, the same very simple drawings and the pictures of sculptured figures that have been features of the previous editions. However, the reader will soon find that Dr. Rathbone's approach to correctives has broadened and changed with the developments of recent years. Chapter 6, "Exercise in Medicine" will be of greatest interest to Corrective Therapists. This is broken down into the subheadings of Psychopathology, General Convalescence, Heart and Circulatory System, Pulmonary Involvements, Nutritional Inadequacies, Arthritis, Neurological Involvements and Orthopedics. The approach is planned to give the student a general orientation to the problems involved; the text is not designed to replace Kraus or similar manuals in the hands of the professional therapist. The term "therapy" is, in fact, rejected for use in the school situation; instead, says the writer, the emphasis must be on retraining or re-education. Reference is made in several instances to the value of imbuing pupils with the desire to attain a "body beautiful." This raises certain questions which are left unanswered, even undiscussed. Just what is the "body beautiful?" Is it the Mr. America and Miss America figure? What would development of such a body do to the performance of an athlete such as Mel Patton or a marathon runner? What is the deciding point between form and function? One wishes that the writer had elaborated more on this important concept. Dr. Rathbone comments that there is a conflict between specialists in physical therapy and in corrective physical education which awaits precise demarcation of the two disciplines. She points out that physical therapy usually means doing something to a person, whereas physical education means helping him do something for himself, and suggests that physical therapists may help the patient in the transition from the hospital to the home, whereas the specialist in correctives is more concerned with long-term rehabilitation. Neither of these distinctions seem to offer a basis for differentiation between the two. In V. A. hospitals the corrective therapist tends to concentrate on gross muscular movements, whereas the physical therapist is concerned with fine muscle movements, plus the use of heat light, electricity ,massage and similar modalities. Whatever demarcation is eventually made will probably be basically along these lines. The fact that these questions are raised is evidence of Dr. Rathbone's awareness of the problems in the field. Most readers have probably utilized this text at some period of their undergraduate training; the reviewer predicts that it will continue to be a standard in its field for a long time to come. PJR

"Creative Rhythmic Movement For Children," by Gladys Andrews (New York: Prentice-Hall, Inc., 1954, $4.75).

This volume concerns the need for cherishing and fostering natural creativity in children. Creativity in any media as a form of self-expression, is set into motion by experiences in doing and in feeling. It is spontaneous and meaningful when it develops out of one's own everyday concerns, and as such, it is an important means of learning and of conveying to others personal feelings, ideas and values.

In this book, Miss Andrews deals chiefly with the creative expression of children through movement — the use of the body as a language tool. While it includes many procedures and suggested methods for teaching children how to create their own ways of rhythmic expression, rather than imitating set patterns, it is great deal more than a teacher's guide-book. It presents children as they really are, in various stages of growth, with changing needs desires and inhibitions. It contains musical selections, projects, action photographs, their drawings and actual conversations — all of which clearly demonstrates the close integration of movement to music, art, writing and social action.

Miss Andrews, at present an Assistant Professor at New York University, has worked for twenty years with children of all ages. Her book is a comprehensive and expert job by one who understands them, who loves and respects their need for self expression as an integral part of their emotional growth and adjustment. ERR

"Practical X-Ray Treatment," by Arthur W. Erskine (St. Paul: The Bruce Publishing Co., 1953, 195 pp., $5.00).

This is the fourth edition of a book first published in 1931. The author makes it clear at the beginning that the methods of treatment described are largely his own. The first part of the book is devoted to the general principles of irradiation and the equipment used. This part is fairly well covered considering the size of the book. The remainder is by the author. This part is almost "cook-book" in style and as such could be misleading to the uninitiated, as radiation therapy is much more than applying a stated number of roentgens to an affected area. No doubt the limitation of the size of the book prevented the author from enlarging on this. Some of the basic fundamentals of cancer therapy are briefly covered. The reviewer takes exception to one concept expressed, namely, that more good would come from simple mastectomy plus irradiation in breast cancer cases, rather than radical mastectomy plus irradiation. This concept would seem to be a backward step in our progress of cancer treatment. This book would be of value to medical students, internes and residents as well as practicing physicians who desire a general view of irradiation therapy in a small sized book. The book is easily read and gives an overall picture of the subject. It however, would be of only limited value to the practicing radiologist as its coverage of the many subjects is of necessity too brief and covers only the more gross features of therapy. JGD

"Mental Hygiene in Teaching," by Fritz Redl and William W. Wattenberg (New York: Harcourt, Brace and Co., 1951, 454 pp., $3.75).

As suggested by the title, this volume confines its field of interest to the relatively elementary psychological principles employed by those engaged in the teaching and guidance fields.

The techniques described by the authors cover a wide range of specifics and in some areas of the text it becomes questionable as to whether or not the various methods cited are in the province of the professional educator or mental hygienist.

Of special value to the teacher-reader is the chapter treating of the teachers' problems as they affect personality attributes. Significantly the reasons enumerated for the choice of teaching as a vocation should be of interest to those in the field as well as those who plan a teaching career. Also stressed is the importance of a teacher-parent alliance and the material presentd in this chapter is outstandingly well organized and practical.

In the final chapter the authors present a realistic summary of the limitations of the use of mental hygiene techniques in the teaching field at the present reading. Their tendency, however, is not to discourage the teacher, or teacher-to-be, but rather to apprise him of the forward steps taken in this field and the possibilities present for those who will see its far reaching benefits for pupil, IF

"An Introduction to Clinical Psychology," Edited by L. A. Pennington, Ph.D. and I. A. Berg, Ph.D., 2nd Edit. (New York: The Ronald Press Co., 1954, 709 pp.).

This revised edition including ten new chapters along with a careful revision of the earlier edition of 1948 is written "for the student who wishes to examine the new field and its pressing problems, its opportunities, approaches and responsibilities."

While the many instruments in psychology are described, the stress is placed upon objectivity and rationale in which both the far horizon and the immediate delimitations are considered. The techniques of the clinical psychologist are objectified in sharp focus through many pertinent illustrations. His role as a research worker is explained and amplified in the realistic framework of daily clinical practice. One of the many fine features of this presentation is the author's recognition of and the status he ascribes to diverse views and methods, there being no stifling assumption of an overall eclecticism. A self-awareness and self-critical attitude which the author ascribes to the discipline of psychology strengthens its validity and authority. The role of progressive psychology as "fostering rigorous training in sciences as opposed to the softer road of psychological artistry" is stressed as the basis for a continuous growth of this newest addition to the professional team.

The first three introductory chapters of this comprehensive treatment discuss the meaning of psychology, theoretical frames of reference and the concept of the normal. Clinical methods are treated in respect to the clinical interview and case record, intelligence testing, interest and personality measurement and projective methods. The problem approach in the clinic includes such topics as mental and educational retardation, psychosomatics, the physically handicapped and psychiatric diagnostic entities.

Following a discerning overview of psychotherapy, such topics as the direct approaches to treatment, client centered therapy, psychoanalytically oriented therapy, group psychotherapy. therapeutic techniques with children and rehabilitative approaches are well written and clearly conceptualized to meet the understanding of the therapist and to foster interest in a more scientific approach to his problems. The final chapter on research in clinical psychology discusses the basic approaches in clinical research.

This contribution prepared by twenty-six contributing specialists is in the opinion of the reviewer, a most practical aid to the activity therapists who are at present experiencing the stimulus of a broad psychological focus on their discipline.

From the standpoint of the corrective therapist, the chapter on Rehabilitative Approaches is especially significant since it points out and clarifies many of the psychogenic elements entering into the process of activity therapy. For this purpose, the chapter written by the editor, is especially informative. Dr. Pennington gained a broad background in clinical neuropsychiatry while chief of the psychological services at the VA Hospital, Danville, Illinois, where a comprehensive program of activity rehabilitation is in effect. This experiential basis enables him to bring a sense of actuality and practicality into his discussion of the professional roles of the vocational counsellor, corrective therapist, occupational therapist, physical therapist, manual arts therapist, educational therapist, speech therapist, music therapist, chaplain, psychiatric nurse and psychiatric aide. He explains both the need and method for an effectively combined liaison of psychotherapy and activity, explains and clarifies the therapeutic activity level and suggests a practical activity therapy inventory based upon skill, physical requirements, mental capacity and the degree of social interaction required. Specific activity-rehabilitative approaches are outlined. A summary presents an evaluation based upon clinical impression and medical evaluation.

All activity therapists will find this contribution, written in their language and oriented to their daily work, a most helpful conceptual framework for an understanding of the combined physical-psychological potentials of their discipline for continuous growth and usefulness as part of the onward progress of society. JED

SCHOLARSHIP FUND

RECEIPTS

Middle Atlantic Chapter, A.P.M.R.	$25.00
Southeastern Chapter, A.P.M.R.	$25.00
Everett M. Sanders, Old Lancaster Rd., So. Sudbury, Mass.	$34.85
Dr. F. S. Schwartz, Medical Director, Birmingham (Ala.) Inst. of Rehabilitation	$50.00
Total	$134.85

First *chapter* to contribute to the fund was the Middle Atlantic Chapter—President, Frank Marasak, Perry Point, Md.

First *individual* contributor to the fund was E. M. Sanders, Editor Emeritus of the Journal of the Association for Physical and Mental Rehabilitation.

FACTS ABOUT THE FUND

NUMBER OF SCHOLARSHIPS	To be determined after all proceeds of the drive have been collected.
AMOUNT OF EACH	$500.00
FUND KNOWN AS	The Association for Physical and Mental Rehabilitation Scholarship Fund.
ELIGIBLE APPLICANTS	Graduates from a college or university approved and accredited by the APMR with a degree in Health and/or Physical Education.
BASIS FOR SELECTION	College records, character, qualities of leadership, seriousness of purpose, ability to meet entrance requirements of special course in Corrective Therapy.
SELECTION COMMITTEE	Chairman of the Funds, President of the APMR, and four members of the Medical Advisory Board.
SCHOLARSHIP TERMS	GRANTS are for one year. Candidates will submit a protocol to include a topic and outline for proposed study.
FOR USE WHERE?	Any accredited college or university in the U.S.A. or territories.
ACCREDITED SCHOOLS	New York University Columbia University Springfield (Mass.) College Univ. of California at Los Angeles George Pepperdine College, Los Angeles Ohio State University Univ. of Illinois Univ. of Kentucky Nebraska Wesleyan Univ. (Lincoln, Neb.) State University of Iowa
APPLICATIONS FOR SCHOLARSHIPS	Address to: The Association for Physical and Mental Rehabilitation, Inc. 1472 Broadway, New York, N. Y. Attn. Chairman, Scholarship Fund

ASSOCIATION FOR PHYSICAL AND MENTAL REHABILITATION SCHOLARSHIP FOUNDATION

(Arthur D. Tauber, Chairman)

The President of the Association for Physical and Mental Rehabilitation has established a national program of financed scholarships as a means of enabling our most gifted and promising students in the field of Health and/or Physical Education to obtain for themselves training in the field of exercise therapy. This scholarship program is not for the welfare of the individual alone; it is in the best interest of the millions of handicapped throughout the nation.

The crisis facing all ancillary therapeutic fields relative to personnel shortages has been increasing steadily. Up to the present time the demand has far exceeded the supply. There exists today a critical shortage of Corrective Therapists or specialists in exercise therapy in convalescent hospitals, rehabilitation centers, psychiatric hospitals, schools, and clinics.

Three major problems confront our group at the present time and they concern education, research and professional development. If we are to improve our technical skill, it is in the continued interest of our organization that we increase the quality of our educational standards, expand our research program, and insure our professional advancement.

In looking toward the future our organization must take steps to assure that ample numbers of potential therapists continue to enter our colleges and universities.

One of the soundest and most practical means of

(Continued on Next Page)

accomplishing our goals would be to support our scholarship foundation. Its object will be to facilitate a more effective educational, research and professional program in colleges and universities, and in general to increase the usefulness and advance the standards and ideals of the profession.

The officers of the Foundation shall be a Chairman, the President of the APMR, and two members of the Medical Advisory board.

The Foundation has the power to accept gifts of funds that will be used exclusively for scholarships and will carry out the general purposes of the Association as defined in the constitution.

Chapter Activities

CALIFORNIA CHAPTER

The California Chapter of the APMR held its fifth bi-monthly program meeting on Oct. 14 at the Veterans Administration Hospital (Brentwood), Los Angeles. The program was devoted to a discussion of rehabilitation for neuropsychiatric patients and the principal speaker was Dr. Richard V. Freeman, Chief, P.M.R.S., at the Brentwood hospital who discussed, "Corrective Therapy and the Neuropsychiatric Patient." The panel which discussed the topic following the lecture included Harry Hart, Joseph Tosches, Norman Lerman, and Fred O'Bannion who discussed treatment procedures for five types of N.P. patients. Harold Brenner acted as chairman of the program committee for the meeting.

The California Chapter has instituted plans for a volunteer service in corrective therapy in local communities, a plan which has been widely endorsed by national association officials.

GRAND CANYON CHAPTER

The Grand Canyon Chapter held its business meeting on August 3. 1954. New officers elected were Arlie Hughes, President; Bob Barton, Vice President, and Russell Nelson, Secretary-Treasurer.

Two new committees were formed at the meeting, a membership committee with James Cushing as chairman and a committee to advance the profession of Corrective Therapy through outside channels. Harlan Wood was appointed chairman of the latter committee with Verl Wilde and Henry White designated to assist him.

MID-WEST CHAPTER

The seventh meeting of the Mid-West Chapter of the Association for Physical and Mental Rehabilitation was held at the new V.A. Research Hospital, Chicago, Illinois, on Saturday, September 18, 1954. The meeting was well attended, with many outlying hospitals sending at least one therapist.

Following registration and refreshments, the President of the Mid-West Chapter, George E. Nash, VAC, Wood, Wisconsin, called the business meeting to order. The remainder of the morning was devoted to business and reading of committee reports.

Following luncheon at the Allerton Hotel, Chicago, Illinois, the meeting reconvened for the clinical session phase of the program. The afternoon session opened with the invocation, given by Rev. Howard S. Kennedy, D.D., Rector, St. James Church, Chicago, Illinois. The welcome address was presented by William W. Fellows, M.D., Manager of the V.A. Research Hospital. Dr. Ben L. Boynton, consultant Phy. Med. & Rehab., V.A. Research Hosp. & Medical Director, Rehab. Institute of Chicago, then presented a practical lecture on 'Corrective Therapy in Rehabilitation.' Dr. Boynton then conducted a discussion period on his topic. Dr. Alex J. Arieff, Attending Neurologist, V.A. Hosp., Hines, Ill., & Ass't Prof. of the Dept. of Neurology & Psychiatry, Northwestern Med. School, Chicago, Ill., was next on the program, and he presented an excellent talk on 'Rehabilitation in Neurological Disorders.' Dr. Arieff than conducted a question and answer period to conclude the clinical session of the program.

An excellent tour of the new V.A. Research Hospital was conducted by Norman Tenner, Chief of C.T., V.A. Research Hospital and John Sikich, C.T. and V.A. Research. Immediately following this tour, Dr. Boynton conducted the group on an informal tour of the Rehabilitation Institute of Chicago where he is Medical Director.

MIDDLE ATLANTIC CHAPTER

The Middle Atlantic Chapter held its first fall meeting on Sept. 25th at the national headquarters of The American Psychological Association, 1333 16th St., NW, Washington, D. C. The program included reports on the National Convention by Dr. John E. Davis and a report on the Representative Assembly Meetings by William Cully in addition to clinical papers by Dr. A. B. C. Knudson, Director PMRS, Dr. Harry Kessler, Chief of Paraplegia, and Dr. Harold Hildreth, Chief Clinical Psychology, all of the V.A. Central Office. Dr. Knudson spoke on the subject, "Corrective Therapy as Part of the Total Rehabilitation Process." "Rehabilitation of Traumatic Paraplegia" was the subject of Dr. Kessler's paper while Dr. Hildreth spoke on "Working Relationships Between Corrective Therapy and Psychology."

OHIO-KENTUCKY CHAPTER

A combined meeting of the Tri-State Chapter of the A.A.R.T. and the Ohio-Kentucky Chapter of the A.P.M.R. was held at Crile V.A. Hospital, Cleveland, Ohio on Sept. 25. The meeting began at 10:30 with an official welcome to members and guests from Dr. Harry T. Zankel, Chief, PMRS at Crile. The key address was delivered by Mr. John Phillips, Manager of the hospital, after which the delegates retired for luncheon. The afternoon session was devoted to "The Overall Program for the Psychiatric Patient" with Dr. Jack Ross acting as co-ordinator of the panel.

ASSOCIATION SCHOLARSHIP INITIATED

The combined Southeastern Chapter Meeting of the Association for Physical and Mental Rehabilitation and the American Association Rehabilitation Therapists held at the Murfreesboro VA Hospital, Murfreesboro, Tennessee, October 8-9, 1954 was most successful. A tour of the Physical Medicine and Rehabilitation Service, a banquet and business meetings presided over by Ray Heaslet, Chapter President, APMR, and John Cole, Chapter President, AART, a visit to the modern home built for the convenience of a paraplegic, and a professional program rounded out two days of interesting and informative events.

The professional program chaired by Dr. L. H. King, local Chief, PM & RS included: A demonstration of creative rhythm for NP patients by Miss Margaret Hitt, Corrective Therapist and a discussion of the psychodynamics of this activity by Dr. S. E. Abel, Chief, Professional Services; a discussion and demonstration of the training leg in ambulation by Dr. A. L. Bugel, Chief, Physical Medicine and Rehabilitation Service, Thayer VA Hospital, Nashville, Tennessee and a discussion on "The Role of Corrective Therapy in Chronic Disease" by Dr. F. S. Schwartz, Assistant Professor of Clinical Medicine, (Physical) Medical College of Alabama.

Dr. F. H. Deter, Chief, Clinical Psychology Service was toastmaster; Dr. Sam Jared, Manager, gave address of welcome and Dr. John E. Davis gave the banquet address on the subject: "Rehabilitation in 1964."

Mr. Louis Montovano presented a most thorough and comprehensive account of the present status, problems, and plans of the Association at the business session. Mr. Montovano discussed the educational problems of Corrective Therapy as a means of providing additional corrective therapists to meet the increasing needs for this personnel in Governmental and other agencies.

Dr. F. F. Schwartz offered to make a yearly contribution of fifty dollars to the scholarship fund in honor of Mr. Lou Montovano as a tribute and recognition for the outstanding work Mr. Montovano has accomplished as

President of the Association for Physical and Mental Rehabilitation. The offer was accepted by the Chapter which also made a contribution to the fund. Mr. Montovano expressed the appreciation of the national officers of the association for this fine evidence of support from Dr. Schwartz who is a diplomat of the American Board of Physical Medicine and Rehabilitation and a leader in this field. Dr. Schwartz also presented a most illuminating and impressive discussion of the rationale and methods of corrective therapy in a paper before the chapter meeting. Our Association desires to impress to him its deep appreciation for his interest in the welfare of this association and his contributions to its professional progress. Congratulations are due to Mr. Montovano for his fine leadership which was given recognition in the action taken by Dr. Schwartz.

LETTERS

(The following letter was recently received by Louis Mantovano, President of the Association for Physical and Mental Rehabilitation in reference to the institution of the organization's Scholarship Fund.)

THE BIRMINGHAM INSTITUTE OF
PHYSICAL MEDICINE AND REHABILITATION
916 South 20th St.
BIRMINGHAM, ALA.

Mr. Louis F. Mantovano
Assoc. for Physical and Mental Rehabilitation
37 Clinton Ave.
Rockville Centre, N. Y.

Dear Lou:

Thank you for your beautiful letter of Oct. 10, 1954 in regard to the scholarship fund.

Your unselfish devotion with untiring efforts toward the benefit of mankind deserves the combined efforts of all of us to help you carry on the immense burden which you so faithfully selected to achieve. My share is indeed very small because I am only an infinite factor in the total program for the rehabilitation of our veterans who fought to preserve our way of life in our God blessed country. In fact, if I could make any contribution in my professional capacity to the national organization, I would be just happy to do so.

Carry on, we are behind you because your work is for the betterment of humanity and such work is sacred.

Please accept this small amount on a yearly basis and as I indicated during the convention—it is a fund in honor of Lou.

Cordially yours,
F. F. SCHWARTZ
Medical Director

News and Comments

THE VOCATIONAL REHABILITATION AMENDMENTS OF 1954

The following summary was prepared from material originally circulated by the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare.

Amendments to the Vocational Rehabilitation Act were passed by both Houses of Congress under Public Law 565 and were approved by President Eisenhower on August 3, 1954.

The amendments improve the system of providing financial assistance to the States by establishing three types of grants-in-aid for vocational rehabilitation:

(a) *Support grants.* Granted on the basis of population weighted by per capita income. The law guarantees that no state will receive less than its allotment for 1954 plus approximately 5½%. This sum is termed "base allotment" and will be granted through 1959 provided that the state's funds continues to equal its 1954 funds. An excess of allotment above this base allotment is granted under a matching formula providing for a 60% pivot Federal share and maximum and minimum Federal shares of 70% and 50%, respectively.

(b) *Extension and Improvement grants.* Allotted on the basis of population with a minimum of $5,000 for encouraging extension and improvement of State rehabilitation programs.

(c) *Special project grants.* Authorized for the purpose of paying part of the cost for research, demonstrations, training, and traineeships, and projects which hold promise for the solution of problems of rehabilitation common to several States. Projects may include establishment of rehabilitation centers and sheltered workshops.

Other changes which will occur as a result of the new amendments include: setting up a National Advisory Council on Vocational Rehabilitation; authority for acquisition of vending stands and other equipment and initial stocks and supplies for use by severely disabled individuals; authority for operation of vending machines within Federal buildings; assurance of preference to the blind in operating vending stands; authority for the appropriation of $30 million, $45 million $55 million, and $65 million during the four fiscal years following 1954 as Federal support to rehabilitation programs.

AWARDS COMMITTEE

The award system of the association is gradually rounding into a full program giving recognition to effort within the total field of rehabilitation. There are awards designed for the membership as well as those who are not included in the active category.

The awards beyond the immediate membership are: The John E. Davis Award presented each year to a person who has illustrated unusual achievement in the vast area related to rehabilitation. This selection is determined by a vote of the Board of Governors of our association and a plaque is presented at the annual banquet. Another award voted this year is one that recognizes a disabled person who has overcome a severe handicap and has illustrated unusual courage and determination in his own rehabilitation.

Within the realm of the active membership the following awards are to be presented: The annual Corrective Therapy Award is to be presented to a member who has shown outstanding qualities of leadership, foresight, courage and determination in his effort in expanding the field of corrective therapy. (This award is not to be confused with the "Fellow" type membership explained later in this article.) "Life Membership" is an award given to an active member for outstanding activity in behalf of the association over a long period of time, one who has dedicated his life to the work of developing the field of corrective therapy. "Honorary Membership" is presented to anyone outside the membership who through unselfish effort has given of his time and resources to extend the association's effort to help the disabled. "Fellow Membership" award is given to an active member who through his efforts in research or by any other scholarly contribution has improved immeasurably the treatment for the patient. A final award is that given for the most outstanding paper presented by a corrective therapist at the annual convention.

The committee feels that there are enough awards available to carry out an excellent recognition program if the membership will make their recommendations with supporting evidence through their area chairmen or directly to the chairman of the Awards Committee. Listed below are the members of the committee and the specific area they represent:

Mr. Sam Boruchov—Area No. 1
Mr. Chris Kopf—Area No. 2
Mr. John Dixon—Area No. 3
Mr. Leon Edman—Area No. 4
Mr. Boyce Nall—Area No. 5
Mr. Rudy Jahn—Area No. 6

GEORGE DEVINS, Committee Chairman,
11091 Poppy Drive
Garden Grove, California

Subject Index--Volume VIII

The first Table of Contents for the Journal appeared in Vol. 4, No. 9. The first Cumulative Subject-Author Index appeared in Vol. 5, No. 6 and a second Index appeared in Vol. 7, No. 6. The Index in this issue lists authors and articles which have been cross-referenced by related subjects. Book reviews and abstracts have been added but not cross-referenced.

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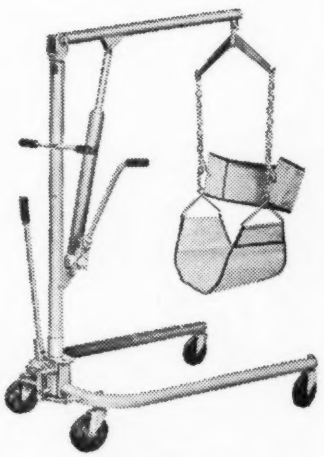

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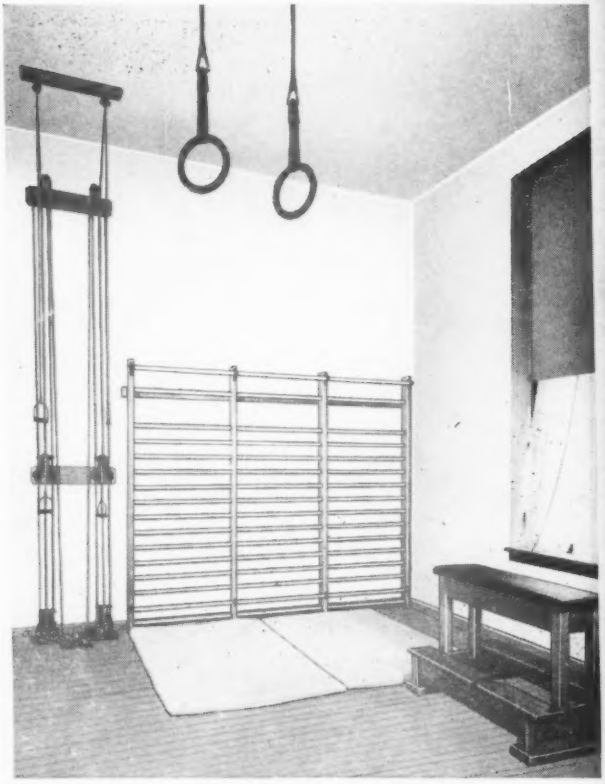

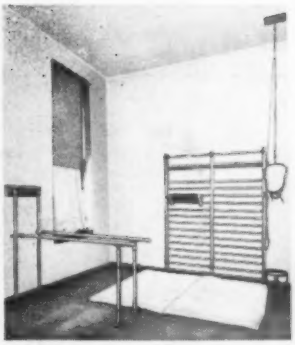

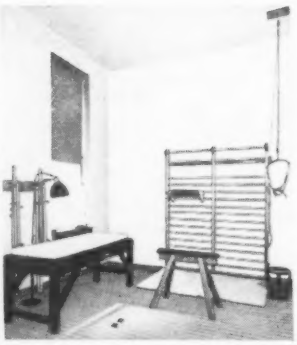

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